Fish Population of Carnation Creek and other Barkley Sound Streams 1983-1984

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ABSTRACT

Andersen, B. C. 1985. Fish populations of Carnation Creek and other Barkley Sound streams 1983-1984. Can. Data Rep. Fish. Aquat. Sci. 553: 62 p.

A summary of fish population data, collected as part of the Carnation Creek Experimental Watershed Project, is presented. The time period covered is from January 1983 to December 1984.

Key words: Watershed study, coho, chum, steelhead, cutthroat, sculpin, logging, Carnation Creek

RESUME

Andersen, B. C. 1985. Fish populations of Carnation Creek and other Barkley Sound streams 1983-1984. Can. Data Rep. Fish. Aquat. Sci. 553: 62 p.

On présente un résumé des données sur les populations de poisson, recueillies dans le cadre d'un project d'étude expérimentale du bassin hydrographique du ruisseau Carnation, de janvier 1983 à decembre 1984.

Mots-clés: étude du bassin hydrographique, saumon coho, saumon kéta, truite arc-en-ciel anadrome, truite fardée, chabot, abattage du bois, ruisseau Carnation

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INTRODUCTION

The Carnation Creek Experimental Watershed Project started in 1970 with the initiation of pre-logging studies (Narver and Chamberlain 1976). Road construction began in January 1975 and logging started in the fall of 1975. Most of the road construction was completed by the end of the 1977-1978 winter. Logging was completed in June 1981 (Fig. 2). A study on the effects of an aereal applied herbicide was started in September 1984.

The basic rational for the study, the study sites, adjacent study streams (Fig. 1), and methods used in fish studies have all been described in Andersen (1983). This report is one in a series on fish populations in Carnation Creek and other Barkley Sound streams (Andersen 1983, 1984). This report covers the period from January 1983 to December 1984.

RESULTS

ADULT STUDIES

Coho

In 1983 the return of coho was within the range of previous years. The 1984 spawning run was the lowest recorded in this study, with the returns of females and large males being almost half the previous lows.

	Return		
Year	Jack (.+)	Large male (.1+)	Female
14 yr mean (1971-1984)	76.9	82.2	68.3
1983	83	52	51
1984	25	27	22

The age compositions of adult coho are given in Table 1.

The 14 year average of yearly mean fork lengths was 33.5 cm for jack coho, 58.4 cm for large males and 64.8 cm for females. In both 1983 and 1984 the mean fork lengths of jacks and females were within the range of previous years, large males had mean fork lengths below the range of previous years. Length distributions and mean length by age and sex are given in Table 3.

Time of entry into Carnation Creek continued to be strongly dependent on stream discharge (Table 2). Eighty-five percent of the adult coho run had passed the counting fence by November 2 in 1983 and by November 19 in 1984.

Chum

The estimates of chum salmon spawning escapement (above and below the fence) in Carnation Creek were:

Year	Escapement
15 year mean (1970-84)	1889 (Range 450-4168)
1983	1200
1984	950

Weekly counts of chum salmon, by sex, passing Carnation Creek fence in 1983 and 1984 are in Table 4.

Length distribution, by sex are given in Table 5. The mean fork lengths were:

Year	Male (cm)	Female (cm)
15 year average of yearly means (1970-84)	72.8	70.4
1983	71.9	69.8
1984	71.6	69.1

The dominant age group of chum adults continued to be 4 year old fish (Table 6). In 1984 the percentage of 3 year old fish in the chum escapement (28.4%) was 2.3 times the 12 year mean (12.3%, 1973-84).

Steelhead and cutthroat

No steelhead or cutthroat were caught in the upstream traps in 1983 and 1984. In 1983 one adult cutthroat (May 9, 33.5 cm) was caught in a downstream trap. In 1984 one adult cutthroat (May 11, 33 cm) and 2 steelhead (June 10) were caught in the downstream traps.

The fact that so few steelhead and cutthroat were caught is not an indication of total returns. When the fence is fishing for juveniles from March to August high stream discharge can flood out the fence and allow adult fish to pass unobserved.

Other salmon

In 1983 and 1984 no pink or chinook adults were observed. In 1983 one pair of sockeye was observed spawning downstream of the fence. No sockeye were observed in 1984.

JUVENILE STUDIES

The basic data on length, length-weight, condition factor, populations, densities, and biomass for juvenile fish are in the appendices.

Downstream migrants

Outmigrations of juvenile salmon in relation to date, maximum daily water temperature and mean daily stream discharge are presented in Figures 3 and 4. Total counts for 1983 and 1984 are summarized in Table 7.

Coho

A summary of juvenile coho outmigration data by age:

Year	Fry run	I+<60 mm run	I + ≥60 mm run	I + ≥60 mm mean length mm	II+ run	II+ mean length mm	Total I +, II+ run ≥60 mm
14 yr. mean 1971-1984	15759[a]	71	2283	81.0[b]	783	100.2[b]	3066
1983	9216	3	3437	86.1	305	103.0	3742
1984	2937	10	2984	84.0	119	102.2	3103

[a]13 year mean (1972-84).
[b]Average of the yearly means.

The number of age I+ coho smolts in both 1983 and 1984 were well above the 14 year mean. Age II+ smolt numbers continued to decline. In 1984 the percent of age II+ smolts in the run was down to 4% compared to an average of 29% over the 14 year period (1971-84).

In 1983 the coho smolt migration was the earliest recorded with the 50% point of the run (Table 8) occurring 9 days earlier than the 14 year mean date of May 5.

The weekly mean lengths of age II+ coho smolts (Fig. 5) were similar to those observed in previous years, but age I+ continued a trend towards larger smolts that started in 1978.

In 1983 and 1984 coho fry numbers were much less than the 14 year mean. The 1984 run was the smallest of all years studied, 29% below the previous low. Timing of the coho fry run continued a trend, started in 1977, of being much earlier than in previous years. The 1984 run was the earliest recorded. Mean lengths of coho fry in the downstream run are summarized in Table 9.

Chum

Chum fry outmigrations from the above fence:

13 year mean 1972-1984	38563
1983	461
1984	0

Timing of chum fry runs are in Table 8, mean lengths in Table 9.

Steelhead and cutthroat

	Steelhead				Cutthroat		
	<100 mm	≥ 100 mm			<100 mm	≥ 100 mm	
Year	Run	Run	Mean length	50% point of run	Run	Run	Mean length
13 year mean 1972-1984	78.6	68.6	140.9a	May 13	12.3	44.1	134.6a
1983	25	124	133.4	May 3	14	40	132.6
1984	5	27	145.0	Apr.21	14	40	120.9

[a]Average of yearly mean lengths.

The 50% point of steelhead smolt outmigration continued a trend, started in 1977, of being much earlier than in previous years. In 1984 the 50% point of the run was the earliest recorded in this study. The number and mean lengths of both steelhead and cutthroat smolts (≥ 100 mm) were within the range of previous years.

The age compositions and mean lengths of juvenile steelhead and cutthroat in the downstream migrations are given in Table 10.

Resident fish

The late summer population estimates and fish densities for the lowest 3070 m of Carnation Creek are given in Tables 11 and 12.

Late summer population estimates for lower Carnation Creek:

	Coho		Rainbow			*Cottus aleuticus*
Age	0	I	0	I	II	All
15 year mean (1970-1984)	10827	1003	1762	268	95	2528a
1983	9922	249	240	171	69	3576
1984	3005	139	1389	57	8	1576

[a]1972-1984

The 1984 population estimates for age 0 coho were the lowest recorded, 28% of 15 year mean and half the previous low. Both 1983 and 1984 age I coho continued a trend started in 1982 of very much lower numbers with the 1984 numbers being 63% of the previous low and 14% of the 15 year mean. The number of rainbow trout continued to be at the low end of the range of previous years. The sculpin population in 1983 was well above the mean but in 1984 was the lowest recorded.

In 1983 late summer fish densities for age 0 and I coho in lower Carnation Creek (Table 12) were at the low end of the range of previous years for all study sections. In 1984 densities in all sections were well below previous lows.

Late summer densities of resident fish in 1983 and 1984 for Carnation Creek and other streams are summarized in Table 13. In both years cutthroat trout densities in Upper Carnation Creek were at the high end of the range of previous years. Tributary "C" densities were within the range of previous years. Coho densities in Useless Creek remained very low. Fish densities in South Pachena were within the range of previous years. Cutthroat densities in Ritherdon Creek were at the low end of the range of previous years.

Late summer biomasses (g/m^2) of resident fish in 1983 and 1984 are summarized for all streams in Table 14.

A summary of late summer mean lengths (mm) for all streams and all salmonid species is given in Table 15. In 1984 Lower Carnation age 0 coho were much larger than in any previous year.

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Table 1. Age composition of adult coho salmon run in Carnation Creek 1983, 1984.

		Total age						Fresh water			Ocean		
		1.+	2.+	Total	1.1+	2.1+	Total	1.	2.	Total	.+	.1+	Total
1983													
♂	n	69	11	80	46	4	50	115	15	130	83	52	135
	%	86.2	13.8		92.0	8.0		88.5	11.5		61.5	38.5	
♀	n	0	0	0	42	9	51	42	9	51	0	51	51
	%				82.4	17.6		82.4	17.6			100.0	
Total	n	69	11	80	88	13	101	157	24	181	83	103	186
	%	86.2	13.8		87.1	12.9		86.7	13.3		44.6	55.4	
1984													
♂	n	20	5	25	23	2	25	43	7	50	25	27	52
	%	80.0	20.0		92.0	8.0		86.0	14.0		48.1	51.9	
♀	n	0	0	0	18	3	21	18	3	21	0	22	22
	%				85.7	14.3		85.7	14.3			100.0	
Total	n	20	5	25	41	5	46	61	10	71	25	49	74
	%	80.0	20.0		89.1	10.9		85.9	14.1		33.8	66.2	

Note: Difference between total freshwater and ocean numbers is due to scales being unreadable in the freshwater zone.

Table 2. Weekly fence count of coho salmon into Carnation Creek by ocean age and sex 1983, 1984.

1983						1984					
				Total						Total	
Week	♀ n	♂(.1+) n	Jack n	n	Accum. %	Week	♀ n	♂(.1+) n	Jack n	n	Accum. %
						Sept.					
						6	0	0	1	1	1.4
						16-22	2	6	7	15	21.6
						23-29	0	0	2	2	24.3
						30-Oct. 6	2	2	2	6	32.4
						Oct.					
Oct.						7-13	7	11	7	25	66.2
20-22	24	25	35	84	45.2	14-20	0	1	0	1	67.6
23-29	15	11	38	64	79.6	21-27	4	1	4	9	79.7
30-Nov. 5	5	8	5	18	89.2	28-Nov. 3	0	0	0	0	79.7
Nov.						Nov.					
6-12	3	6	1	10	94.6	4-10	0	0	1	1	81.1
13-19	2	2	3	7	98.4	11-17	2	0	0	2	83.8
20-26	2	0	1	3	100.0	18-24	5	2	0	7	93.2
						25-Dec. 1	0	0	0	0	93.2
						Dec.					
						2-8	0	1	1	2	95.9
						9-15	0	3	0	3	100.0
Total	51	52	83	186			22	27	25	74	

Note: On Oct. 21, 1984 one unspawned ♀ (73 cm, age 1.1+) was dead in trap. This fish is included in all adult coho tables.

Table 3. Length frequency and mean length of adult coho salmon in Carnation Creek by ocean age and sex 1983, 1984.

Fork length	Jacks (.+)		Large males (.1+)		Females (.1+)	
(cm)	1983	1984	1983	1984	1983	1984
22		1				
23						
24		1				
25	1	1				
26		1				
27		1				
28	1	3				
29	3	2				
30	2	3				
31	7	2				
32	5	3				
33	10	3				
34	10					
35	11					
36	9	1	1			
37	5	3		1		
38	7		1			
39	3			1		
40	6					
41	1			2		
42			1	1		
43	1		2			
44			1	1		
45			2	2		
46					2	
47				2		
48			5	1		1
49			2	1	2	
50			3	1	1	
n	82	25				
$\bar{x}$(cm)	34.73	30.40				

Note: in 1983 one Jack coho was lost upstream without being measured.

Table 3 (cont'd)

Fork length (cm)	Large males (.1+)		Females (.1+)	
	1983	1984	1983	1984
51	2	1	2	
52	3			
53	3		1	1
54	2	1	2	1
55	2			
56	2	1	5	1
57	1	1	1	
58	2	2	2	1
59	2		1	1
60	1	1	4	
61	1	1	1	1
62	2			1
63	1		6	2
64		1	2	1
65	2	1	5	1
66	4		2	2
67	1		2	1
68			2	1
69	1		2	1
70	1		1	1
71			2	
72		1		1
73			2	2
74			1	
75		1		
76				
77	1	1		1
78				
79		1		
n	52	27	51	22
$\bar{x}$(cm)	54.75	54.15	61.16	63.95

Table 4. Weekly count of adult chum salmon, by sex, passing Carnation Creek fence in 1983, 1984.

Week	♀ n	♂ n	Total n	Total Accum %	Week	♀ n	♂ n	Total n	Total Accum %
	1983					1984			
Oct.					Oct.				
20-22	0	8	8	66.7	25-27	11	28	39	47.6
23-29	0	2	2	83.3	28-Nov. 3	4	10	14	64.6
30-Nov 5	0	2	2	100.0	Nov.				
					4-10	4	9	13	80.5
					11-17	3	9	12	95.1
					18-24		1	1	96.3
					25-Dec. 1				
					Dec.				
					2-8	2	1	3	100.0
Total		12	12			24	58	82	

Note: In 1984 most adult chum salmon passing the fence were caught in a lift net below the fence and released upstream of fence.

Table 5. Length frequency (fork length) of adult chum salmon by sex in Carnation Creek 1983, 1984.

Fork length (cm)	Males		Females	
	1983	1984	1983	1984
56		1		
57		1		1
58	1			
59		2		1
60				2
61			1	
62		2	3	3
63	1	5	3	7
64	5	5		5
65	1	3	2	10
66	4	4	3	5
67	4	9	1	10
68	3	8	3	13
69	4	8	7	13
70	6	10	2	8
71	3	5	3	9
72	5	5	6	7
73	1	8	3	10
74	4	6	8	7
75	2	8	2	6
76	4	5	3	5
77	1	5		2
78	5	6		
79	1	8		
80	4	1		1
81				
82		1		
83	1	1		1
84	1	1		
85		1		
86		1		
87				
88	1	1		
95		1		
n	62	122	50	126
$\bar{x}$ (cm)	71.9	71.6	69.8	69.1

Table 6. Fork length and age composition (otoliths) of chum salmon in Carnation Creek 1983 and 1984.

Fork length (cm)	Males						Females					
	0.2		0.3		0.4		0.2		0.3		0.4	
	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984
58	1											
59		1		1								
60								1				
61							1					
62							3	2				
63	1	3					1	2	2	2		
64	3	2	1	1				3		1		
65		1	1	2			1	4	1	5		
66		1	3	3				4	3	2		
67		1	4	2				4	1	5		
68		4	3	1				2	3	7		
69		2	4	4			1	1	5	7		
70	1	4	3	2				2	2	5		
71			2	3			1		1	8		
72	1		3	2			1		5	4		
73				3					4	7		
74			4	2		1			7	5		
75			1	3					2	5		1
76			3	2					2	4	1	
77				3		1						1
78			3		1							
79			1	2		1						
80			2	1	1							1
81												
82						1						
83			1	1								
84					1							
85												
86												
87												
88					1							
n	7	19	39	38	4	4	9	25	38	67	1	3
$\bar{x}$ (cm)	65.0	66.5	71.7	71.6	82.5	78.0	65.2	65.6	70.7	70.3	76.1	77.3
%	14.0	31.1	78.0	62.3	8.0	6.6	18.7	26.3	79.2	70.5	2.1	3.2

Table 7. Summary of downstream counts of juvenile salmonids and cottids at the Carnation Creek counting fence 1983, 1984.

Species	Age	1983	1984
Chum	Fry	461	0
Coho	Fry	9216	2937
	I + (<60 mm)	3	10
	I + (≥60 mm)	3437	2984
	II +	305	119
	Total I + (≥60 mm), II +	3742	3103
Steelhead	<100 mm	25	5
	≥100 mm	124	27
Cutthroat	<100 mm	14	14
	≥100 mm	40	40
Cottus asper		476[a]	153
Cottus aleuticus		79[a]	22
Sampling period		March 1-August 4	March 5-July 20

[a]Counts end July 21

Table 8. Dates when 25, 50, and 75% of the downstream migration of coho, chum, and steelhead occurred in Carnation Creek 1983, 1984.

Species	Accum %	1983	1984
Coho smolts	25	April 15	April 24
	50	April 24	May 6
	75	May 3	May 16
Steelhead (≥100 mm)	25	April 24	April 8
	50	May 3	April 21
	75	May 8	May 1
Coho fry	25	March 18	March 18
	50	March 28	March 20
	75	April 1	April 9
Chum fry	25	March 22	
	50	March 24	
	75	March 27	

Table 9. Mean length, range, and standard deviation of coho and chum fry in the 1983 and 1984 Carnation Creek outmigrations.

Date	Coho fry				Chum fry			
	$\bar{x}$ (mm)	n	s	Range (mm)	$\bar{x}$ (mm)	n	s	Range (mm)
1983								
March 16	35.68	57	.890	32-38				
20					43.36	45	.773	42-45
24					43.54	50	.676	42-45
26	37.41	49	1.079	34-40				
31	37.40	50	1.161	33.39				
April 8	37.50	50	2.628	31-40				
May 10	37.51	55	3.661	32-48				
June 10	44.09	55	4.975	36-54				
12	42.84	38	4.618	35-54				
16	46.79	80	5.083	37-62				
29	49.26	27	4.311	42-59				
July 16	51.02	140	3.771	41-61				
1984								
March 7	34.78	49	.587	33-37				
16	37.35	40	.949	35-40				
23	35.31	58	.777	33-38				
April 6	34.83	69	1.084	33-39				
13	36.13	45	1.632	33-40				
20	32.11	94	1.410	30-39				
June 13	56.66	29	4.708	46-66				
30	55.81	47	4.707	43-62				

Table 10. Age composition and mean lengths of rainbow and cutthroat trout in the downstream migrations in Carnation Creek 1983, 1984.

		Rainbow				Cutthroat			
Year	Age	n	$\bar{x}$ (mm)	S	Range (mm)	n	$\bar{x}$ (mm)	S	Range (mm)
1983	I	50	100.5	13.27	74-120	19	97.0	12.87	76-123
	II (all)	74	134.5	19.70	96-170	26	135.5	20.78	107-202
	II (≥100 mm)	72	135.5	18.96	103-170	26	135.5	20.78	107-202
	III	12	177.2	20.28	147-217	2	191.5	38.89	164-219
	Total (≥100 mm)	113	133.4	25.05	101-217	36	132.6	26.48	100-219
1984	I	5	96.2	13.22	85-113	25	98.4	11.34	79-114
	II (all)	16	124.5	14.64	93-148	20	125.8	12.31	102-153
	II (≥100 mm)	15	126.6	12.41	106-148	20	125.8	12.31	102-153
	III	10	179.6	19.25	163-215	2	158.0	7.07	153-163
Total	(≥100 mm)	27	145.0	30.97	106-215	35	120.9	15.96	100-163

Table 11. Late summer resident population estimates on lower Carnation Creek (3070 m) 1983, 1984.

	1983				1984			
			95% CI				95% CI	
Species	Age	n	Lower	Upper	Age	n	Lower	Upper
Coho	0	9922	9879	9965	0	3005	2973	3046
	I	249	240	266	I	139	81	195
	Total	10171			Total	3144		
Rainbow	0	240	232	257	0	1389	1316	1462
	I	171	-9	352	I	57	-	-
	II	69	60	77	II	8	-	-
	III	-	-	-	III	-	-	-
	Total	480			Total	1454		
Cutthroat	0				0			
	I	111	103	120	I	73	65	81
	II	103	0	206	II	16	-	-
	III				III			
	Total	214			Total	89		
Cottus aleuticus	All	3576	2247	4905	All	1576	1275	1876

Table 12. Late summer fish density (fish/m^2)by study section and species in lowest 3070 m of Carnation Creek 1983, 1984.

Species	Age	II	III	IV	V	VI	VIII	Combined[a]
1983								
Coho	0	.51	.57	.67	.61	.54	.69	.59
	I	.01	.02	.03	.03	~.01	.01	.015
Rainbow	0							.01
	I							.01
	II							.004
	III							
Cutthroat	0							
	I							.01
	II							.01
	III							
C. asper	All	.05						
C. aleuticus	All	.67	.08	.17	.10	.08	.04	.21
1984								
Coho	0	.23	.24	.31	.14	.19	.06	.20
	I	0	.004	.003	.01	.06	.01	.01
Rainbow	0							.09
	I							.004
	II							.001
	III							
Cutthroat	0							
	I							.005
	II							.001
	III							
C. asper	All	.05						
C. aleuticus	All	.17	.08	~.10	.11	.10	.05	.10

[a]Not a mean but derived from areas and catches in all sections combined for population estimates.

Table 13. Late summer fish density (fish/m^2) by species for all streams 1983, 1984.

Species	Age	Lower Carnation	Upper Carnation	Trib "C"	Useless	Ritherdon	South Pachena
1983							
Coho	0	.59			.02		.65
	I	.015					.10
Rainbow	0	.01					.04
	I	.01					.01
	II	.004					
	III						.003
Cutthroat	0		.35	.28	.05	.07	
	I	.01	.14	.14	.09	.06	
	II	.01	.08	.07	.04	.05	
	III		.01	.02	.01	.004	
C. asper	All						.25
C. aleuticus		.21			.29		.34
1984							
Coho	0	.20			.01		.76
	I	.01					.02
Rainbow	0	.09					.25
	I	.004					.01
	II	.001					
	III						
Cutthroat	0		.16	.48	.08	.24	.10
	I	.005	.24	.05	.06	.05	.01
	II	.001	.04	.03	.04	.02	.003
	III			.01			
C. asper	All				.03		.12
C. aleuticus	All	.10			.23		.21

Table 14. Late summer biomass per unit area (g/m^2) by species for all streams studied in 1983, 1984.

Species	Age	Lower Carnation	Upper Carnation	Trib "C"	Useless	Ritherdon	South Pachena
1983							
Coho	0	1.51			.06		1.06
	I	.11					.66
Rainbow	0	.04					.05
	I	.13					.09
	II	.11					.27
	III						
Cutthroat	0		.31	.63	.06	.08	
	I	.06	.70	1.03	.52	.65	
	II	.21	1.19	1.02	.66	1.75	
	III		.36	1.05	.60	.24	
C. asper	All						1.63
C. aleuticus	All	.76			1.24		.83
1984							
Coho	0	.87			.02		1.87
	I	.07					.17
Rainbow	0	.29					.33
	I	.07					.09
	II	.01					
	III						
Cutthroat	0		.18	.68	.12	.26	.13
	I	.07	1.59	.38	.42	.50	.07
	II	.07	.85	.93	.98	.68	.24
	III			.89			
C. asper	All						1.23
C. aleuticus	All	.67			.95		.79

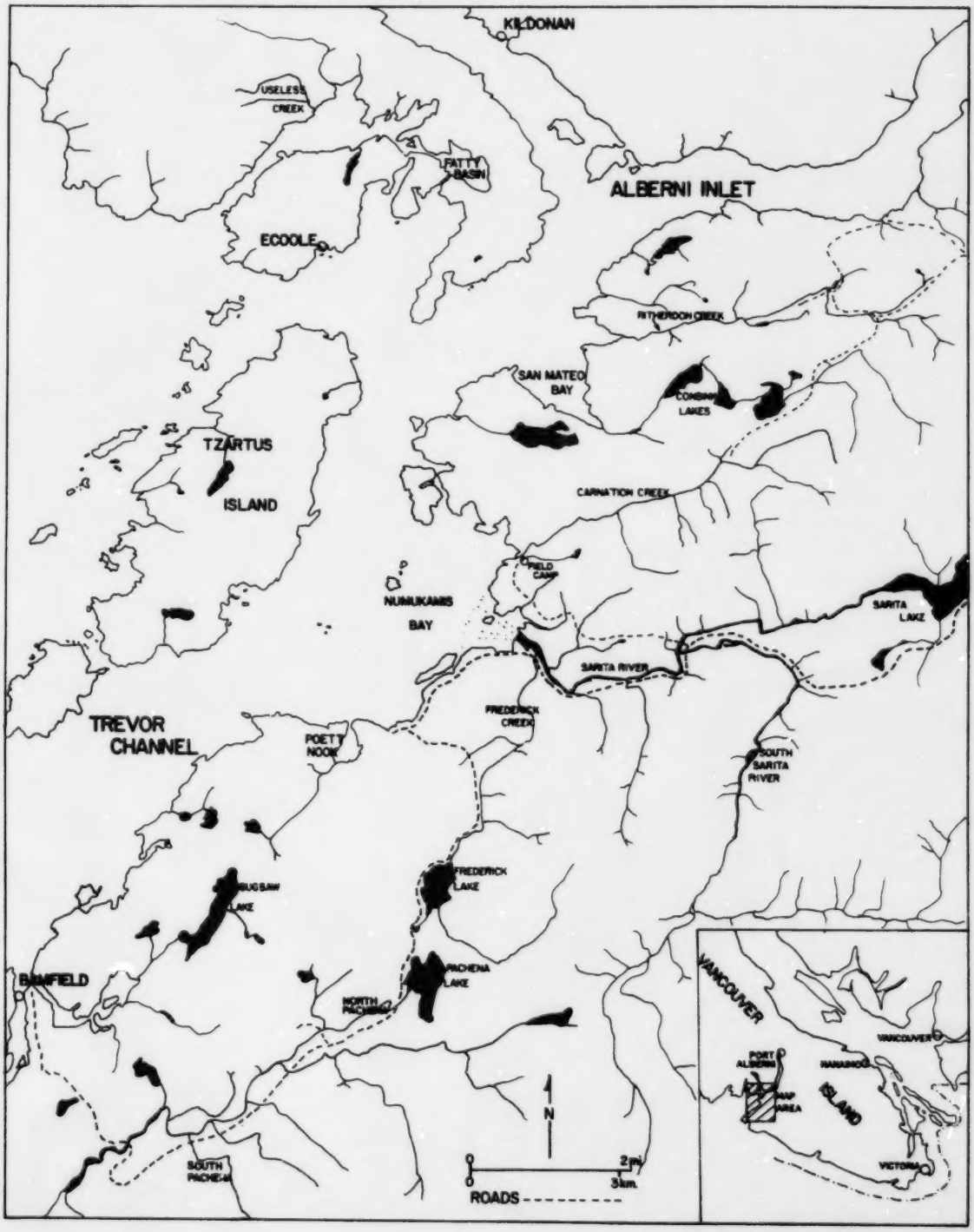
Table 15. Late summer mean lengths (mm) for salmonids in all streams studied in 1983, 1984.

Species	Age	Lower Carnation	Upper Carnation	Trib 1600	Trib "C"	Useless	Ritherdon	South Pachena
1983								
Coho	0	60.9		62.0		62.7(3)		53.5
	I	86.3						85.1
Rainbow	0	66.2						53.6
	I	110.5						100.3(3)
	II	137.4						
	III							201.0(1)
Cutthroat	0		45.8		60.0	48.0(5)	48.0	
	I	96.8	81.6		91.4	85.3	104.5	
	II	147.7	113.3		116.8(6)	122.5(6)	155.0	
	III		152.5(2)		165.0(2)	177.5(2)	194.0(1)	
1984								
Coho	0	73.2				68.0(1)		60.3
	I	89.4						89.0
Rainbow	0	66.2						50.3
	I	87.1						110.0
	II	128.0(1)						
	III							
Cutthroat	0		47.3		51.9	52.8	46.9	51.0
	I	112.3	86.8		90.7(6)	89.1	102.6	99.5(2)
	II	193.0(2)	130.9		138.3(4)	139.5(6)	154.8(5)	198.0(1)
	III				223.0(1)			

Note: If the number of fish in a sample is small that number is in brackets after the mean length.

FIGURES

Fig. 1. Map showing location of study streams in the Barkley Sound area. Only main roads shown.


KILDONAN
USELESS CREEK
FATTY BASIN
ALBERNI INLET
ECOOLE
RITHERDON CREEK
SAN MATEO BAY
CONDOR LAKES
TZARTUS ISLAND
CARNATION CREEK
FIELD CAMP
NUMUKAMIS BAY
SARITA LAKE
SARITA RIVER
TREVOR CHANNEL
POETT NOOK
FREDERICK CREEK
SOUTH SARITA RIVER
FREDERICK LAKE
BUGSAW LAKE
BAMFIELD
ACHENA LAKE
NORTH PACHENA
SOUTH PACHENA
N
2mi
3km
ROADS
VANCOUVER
VANCOUVER
PORT ALBERNI
NANAIMO
MAP AREA
ISLAND
VICTORIA

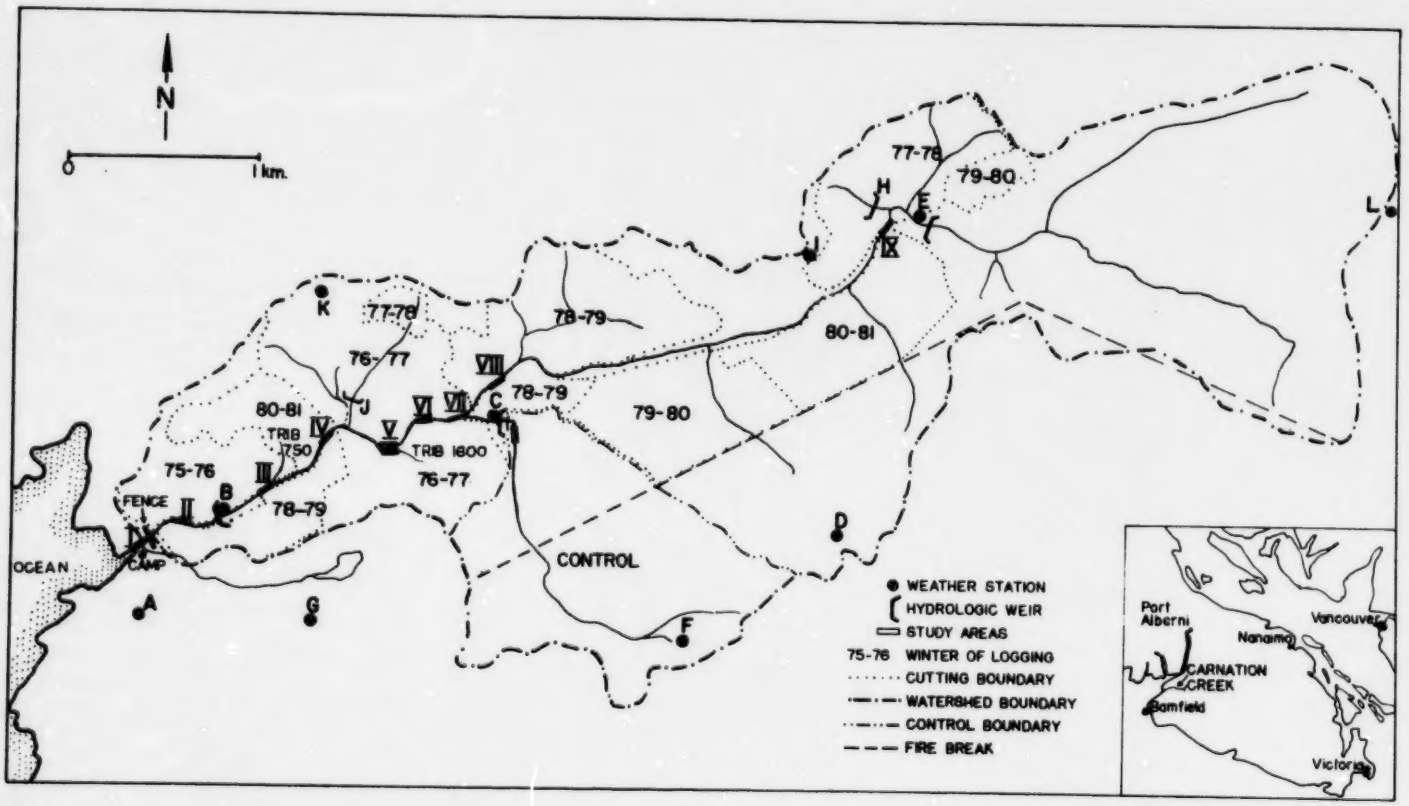


Fig. 2. Carnation Creek Watershed showing the main channel and tributaries; location of hydro-meteorological stations, fish counting fence, stream study sections and clearcuts.

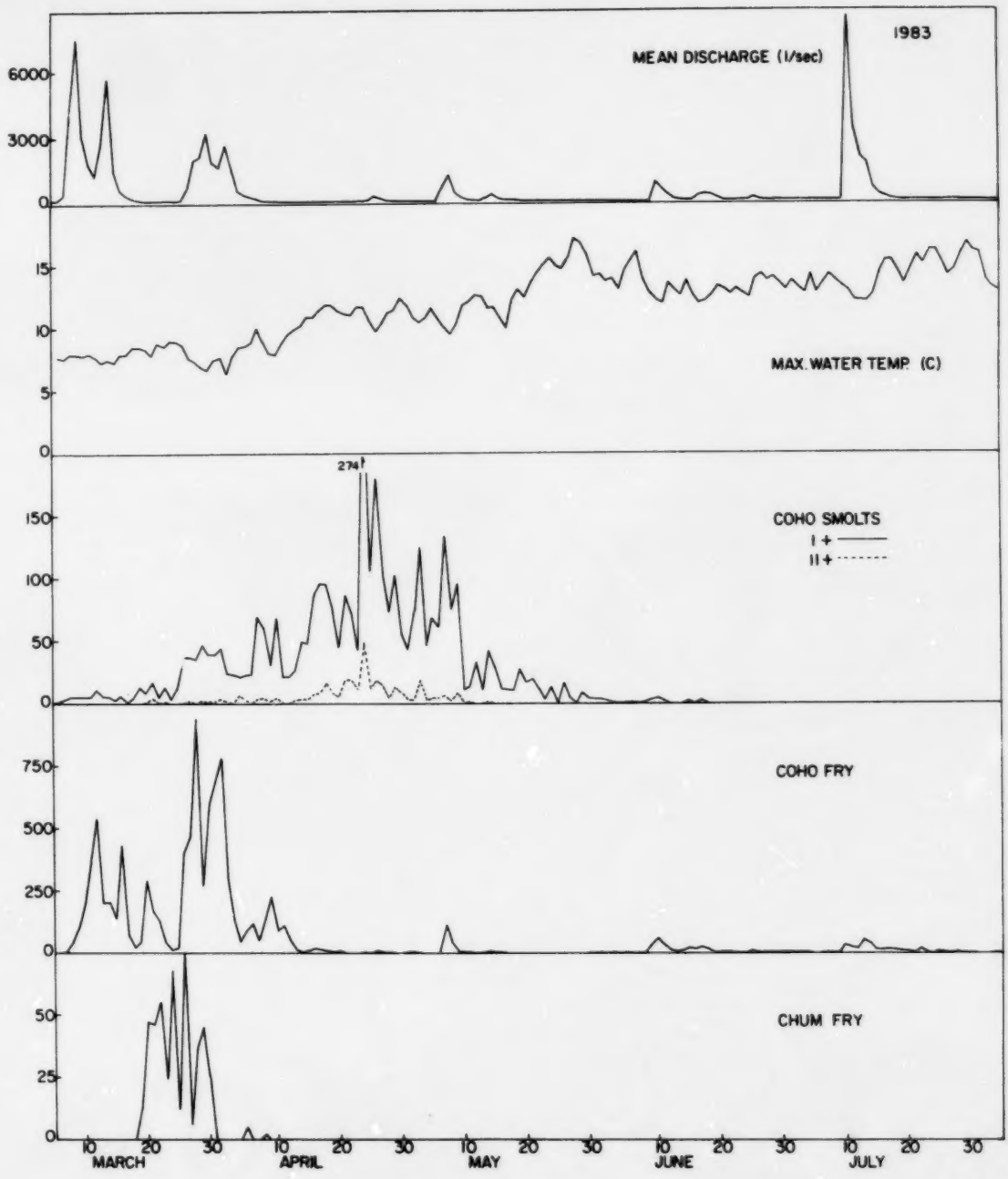


Fig. 3. Outmigration of juvenile salmon from Carnation Creek in relation to date, water temperature and discharge, 1983.

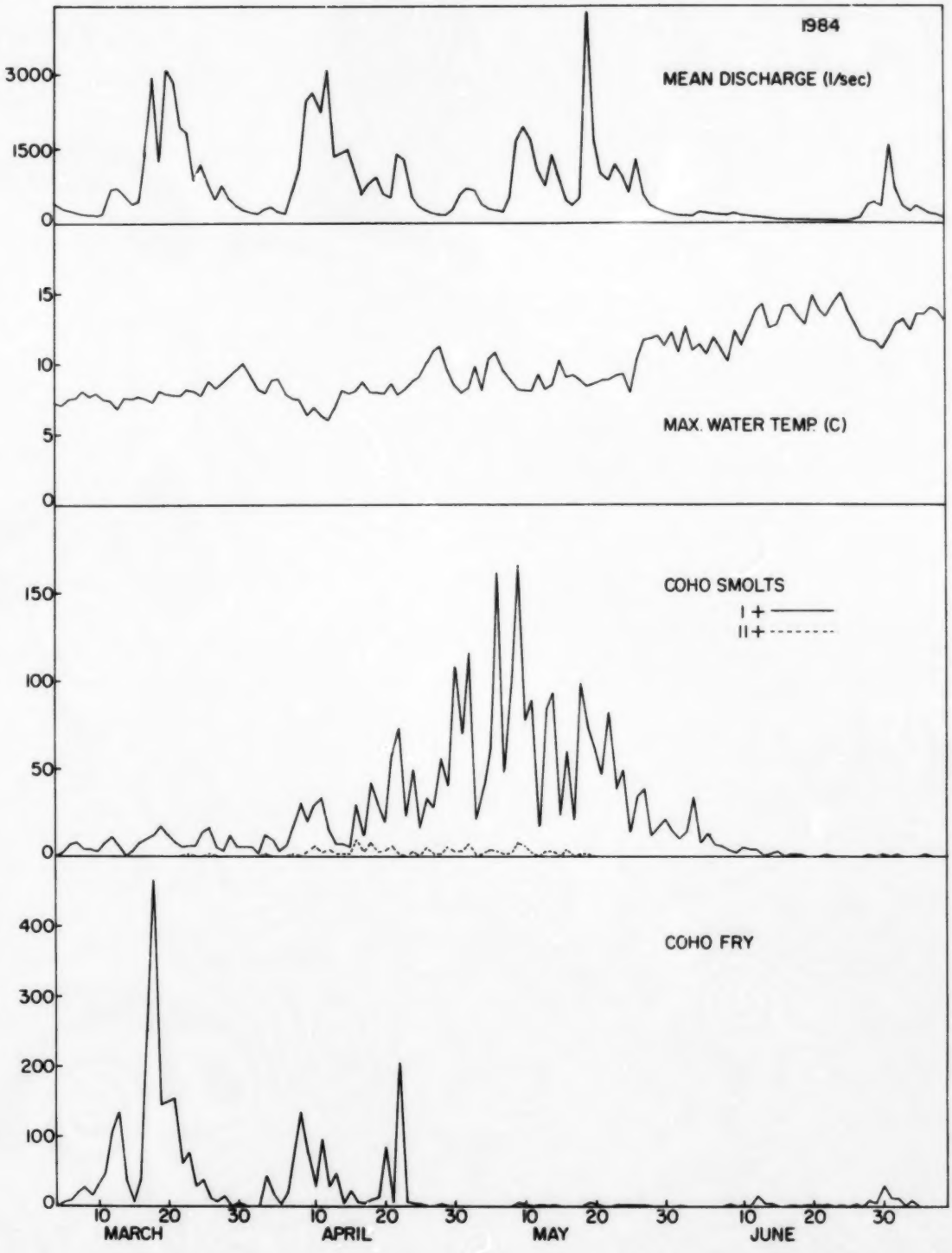


Fig. 4. Outmigration of juvenile salmon from Carnation Creek in relation to date, water temperature and discharge, 1984.

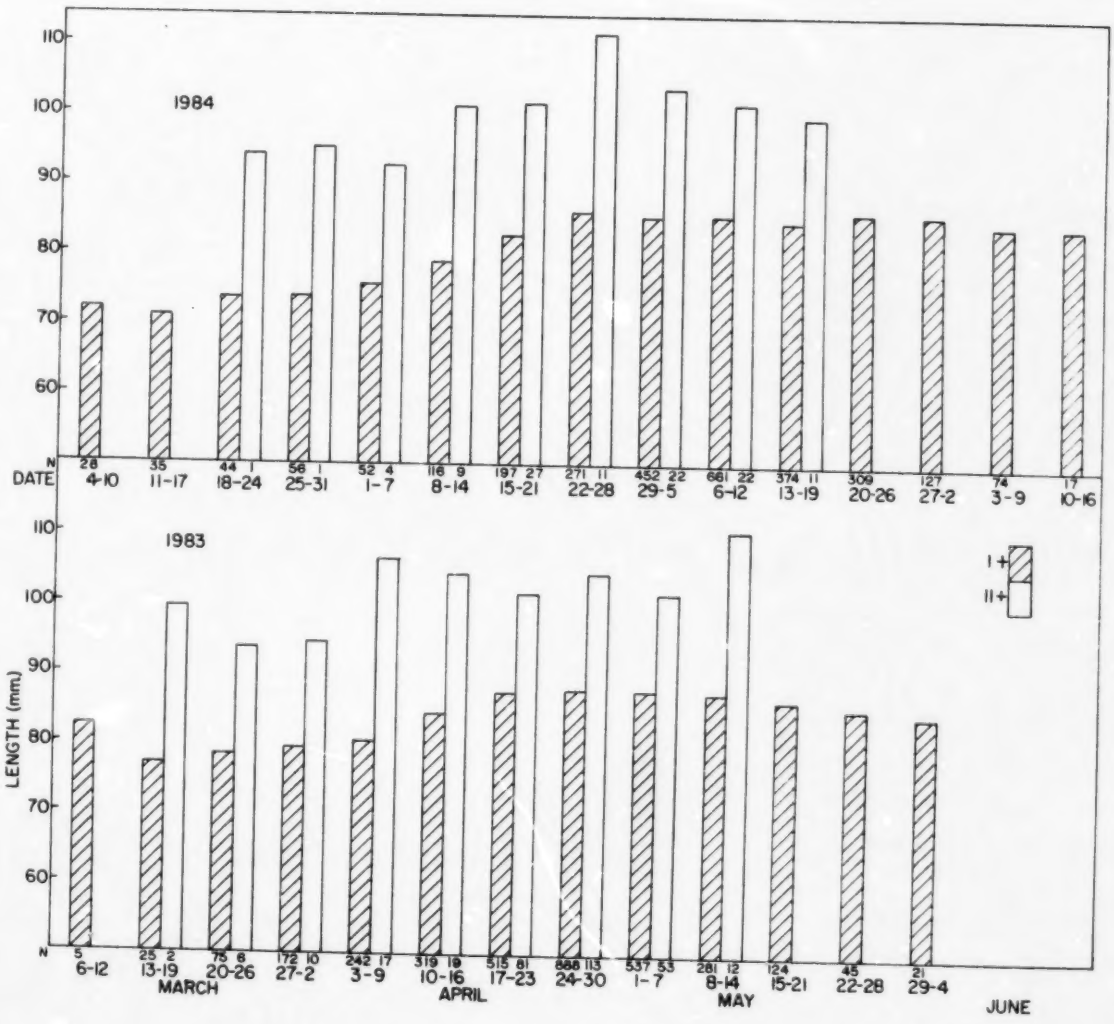


Fig. 5. Weekly mean lengths of age I and II coho smolts (>59 mm) leaving Carnation Creek in 1983 and 1984.

APPENDIX TABLE I. CARNATION CREEK COHO.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 24-27/83																				
II	0	395	26	65	262	49	322	24.9	312	332	0.81	1.01	45.5	0.82	12.40	0.87	325.5	0.82	12.52	0.88
	I				4	1	5	1.0	3	7	0.75	4.93	76.6	0.01	0.21	0.01	26.3	0.07	1.01	0.07
III	0	245	28	52	221	38	267	16.3	259	275	0.83	0.92	43.9	1.09	9.53	1.23	244.7	1.00	8.74	1.13
	I				6	1	7	0.4	6	8	0.83	5.09	77.6	0.03	0.26	0.03	36.6	0.15	1.31	0.17
IV	0	399	97	58	364	64	442	28.7	431	452	0.82	0.99	45.1	1.11	4.55	1.46	437.7	1.10	4.51	1.45
	I				10	1	11	0.2	10	12	0.90	4.59	74.5	0.03	0.11	0.04	51.0	0.13	0.53	0.17
V	0	207	44	53	90	33	142	102.8	122	162	0.63	1.05	46.2	0.69	3.23	0.87	149.4	0.72	3.39	0.92
	I				4	3	16	1008.0	-47	79	0.25	7.61	79.7	0.08	0.36	0.10	121.7	0.59	2.77	0.75
VI	0	426	73	57	309	76	410	72.0	393	427	0.75	0.73	41.8	0.96	5.61	1.16	300.8	0.71	4.12	0.85
	I				3	0	3	0.0	3	3	1.00	3.70	68.3	0.01	0.04	0.01	11.1	0.03	0.15	0.03
VIII	0	223	46	70	325	44	376	12.1	369	383	0.86	0.79	42.6	1.69	8.17	2.12	295.4	1.32	6.42	1.67
	I				0	1						3.82	69.0							
ALL	0	1895	314	355	1571	304	1948	166.0	1922	1974	0.81	0.89	43.9	1.03	6.20	1.23	1742.9	0.92	5.55	1.10
	I				27	7	36	7.6	31	42	0.74	3.94	69.6	0.02	0.12	0.02	143.7	0.08	0.46	0.09
JULY 26-28/83																				
II	0	434	13	69	209	36	252	15.5	245	260	0.83	2.11	57.2	0.58	19.42	0.60	533.0	1.23	41.00	1.27
	I				3	0	3	0.0	3	3	1.00	5.68	80.0	0.01	0.23	0.01	17.0	0.04	1.31	0.04
III	0	239	23	52	129	24	158	12.1	152	165	0.81	2.52	60.3	0.66	6.89	0.73	398.6	1.67	17.33	1.85
	I				4	2	8	24.0	-2	18	0.50	6.62	87.5	0.03	0.35	0.04	52.9	0.22	2.30	0.25
IV	0	396	70	58	280	41	328	13.0	321	335	0.85	2.21	57.9	0.83	4.69	1.01	725.0	1.83	10.36	2.22
	I				6	3	12	36.0	0	24	0.50	6.36	85.4	0.03	0.17	0.04	76.3	0.19	1.09	0.23
V	0	238	36	49	152	10	163	0.9	161	165	0.93	2.29	58.7	0.68	4.52	0.81	372.6	1.57	10.35	1.84
	I				6	0	6	0.0	6	6	1.00	6.58	84.2	0.03	0.17	0.03	39.5	0.17	1.10	0.20
VI	0	359	84	63	214	5	219	0.1	218	220	0.98	2.07	56.9	0.61	2.61	0.80	452.7	1.26	5.39	1.65
	I				2	0	2	0.0	2	2	1.00	6.49	84.0	0.01	0.02	0.01	13.0	0.04	0.15	0.05
VIII	0	290	37	67	196	14	211	1.4	209	213	0.93	1.97	56.1	0.73	5.70	0.83	416.0	1.43	11.24	1.64
	I				4	0	4	0.0	4	4	1.00	7.38	87.5	0.01	0.11	0.02	29.5	0.10	0.80	0.12
ALL	0	1956	263	358	1180	130	1326	25.4	1316	1336	0.89	2.17	57.7	0.68	5.04	0.78	2883.7	1.47	10.96	1.70
	I				25	5	31	2.9	28	35	0.80	6.53	85.2	0.02	0.12	0.02	204.1	0.10	0.78	0.12

APPENDIX TABLE I. CARNATION CREEK COHO.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
SEP. 19-22/83																				
II	0	434	13	69	197	22	222	4.4	218	226	0.89	2.52	60.6	0.51	17.06	0.53	557.7	1.29	42.90	1.32
	I				3	1	5	2.3	2	8	0.67	8.90	92.5	0.01	0.35	0.01	40.1	0.09	3.08	0.10
III	0	239	23	52	134	2	136	0.0	136	136	0.99	3.02	64.4	0.57	5.91	0.63	410.5	1.72	17.85	1.90
	I				4	0	4	0.0	4	4	1.00	8.15	88.8	0.02	0.17	0.02	32.6	0.14	1.42	0.15
IV	0	396	70	58	236	26	265	5.1	261	270	0.89	2.55	60.9	0.67	3.79	0.81	676.3	1.71	9.66	2.07
	I				9	1	10	0.2	9	11	0.89	7.99	87.9	0.03	0.14	0.03	80.9	0.20	1.16	0.25
V	0	238	36	49	140	4	144	0.1	143	145	0.97	2.65	61.6	0.61	4.00	0.71	381.8	1.60	10.60	1.89
	I				7	0	7	0.0	7	7	1.00	7.33	85.7	0.03	0.19	0.03	51.3	0.22	1.43	0.25
VI	0	359	84	63	184	8	192	0.4	191	194	0.96	2.40	59.8	0.54	2.29	0.70	461.9	1.29	5.50	1.68
	I				1	1						7.37	86.0							
VIII	0	290	37	67	189	10	200	0.7	198	201	0.95	2.37	59.4	0.69	5.39	0.79	473.2	1.63	12.79	1.87
	I				2	0	2	0.0	2	2	1.00	8.15	89.5	0.01	0.05	0.01	16.3	0.06	0.44	0.06
ALL	0	1956	263	358	1080	72	1157	6.7	1152	1162	0.93	2.56	60.9	0.59	4.40	0.68	2956.8	1.51	11.24	1.75
	I				26	3	29	0.6	28	31	0.88	7.44	86.3	0.02	0.11	0.02	218.8	0.11	0.83	0.13
MAY 28-30/84																				
II	0	473	126	73	76	14	93	6.9	88	98	0.82	1.01	46.0	0.20	0.74	0.27	94.6	0.20	0.75	0.27
III	0	295	116	55	57	8	66	2.3	63	69	0.86	1.04	46.4	0.22	0.57	0.37	69.2	0.23	0.60	0.39
IV	0	446	171	53	98	26	133	30.0	122	144	0.73	1.21	48.1	0.30	0.78	0.49	161.8	0.36	0.95	0.59
	I				5	0	5	0.0	5	5	1.00	3.86	70.2	0.01	0.03	0.02	19.3	0.04	0.11	0.07
V	0	326	154	66	28	7	37	6.9	32	43	0.75	0.98	45.6	0.11	0.24	0.22	36.6	0.11	0.24	0.21
VI	0	279	142	52	28	1	29	0.0	29	29	0.96	1.01	46.2	0.10	0.20	0.21	29.5	0.11	0.21	0.22
	I				4	0	4	0.0	4	4	1.00	4.78	73.5	0.01	0.03	0.03	19.1	0.07	0.13	0.14
VIII	0	510	342	98	39	7	48	3.3	44	51	0.82	1.05	46.6	0.09	0.14	0.28	50.1	0.10	0.15	0.30
	I				0	1						6.60	80.0							
ALL	0	2329	1051	397	326	63	404	34.3	392	416	0.81	1.08	46.8	0.17	0.38	0.32	438.2	0.19	0.42	0.34
	I				9	1	10	0.2	9	11	0.89	6.22	78.6	0.00	0.01	0.01	63.0	0.03	0.06	0.05

APPENDIX TABLE I. CARNATION CREEK COHO.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
JULY 24-26/84																				
II	0	335	15	71	104	14	120	3.8	116	124	0.87	2.97	64.1	0.36	8.01	0.38	357.0	1.07	23.80	1.12
	I				2	0	2	0.0	2	2	1.00	5.75	78.5	0.01	0.13	0.01	11.5	0.03	0.77	0.04
III	0	226	55	56	74	16	94	11.1	88	101	0.78	2.97	64.0	0.42	1.72	0.55	280.3	1.24	5.10	1.64
	I				0	1						8.61	93.0							
IV	0	277	38	53	145	17	164	3.7	160	168	0.88	2.30	59.0	0.59	4.32	0.69	377.5	1.36	9.93	1.58
	I				2	2						5.99	79.8							
V	0	258	69	68	52	9	63	3.9	59	67	0.83	2.74	62.9	0.24	0.91	0.33	172.2	0.67	2.50	0.91
	I				3	1	5	2.3	2	8	0.67	6.91	84.8	0.02	0.07	0.02	31.1	0.12	0.45	0.16
VI	0	191	30	52	45	12	61	14.0	54	69	0.73	2.95	64.5	0.32	2.05	0.38	181.0	0.95	6.03	1.12
	I				5	1	6	0.6	5	8	0.80	6.28	81.3	0.03	0.21	0.04	39.3	0.21	1.31	0.24
VIII	0	354	123	100	60	2	62	0.1	62	63	0.97	3.24	66.6	0.18	0.50	0.27	200.9	0.57	1.63	0.87
	I				3	0	3	0.0	3	3	1.00	6.77	84.0	0.01	0.02	0.01	20.3	0.06	0.17	0.09
ALL	0	1641	330	400	480	70	562	22.0	553	571	0.85	2.77	62.8	0.34	1.70	0.43	1559.0	0.95	4.72	1.19
	I				15	5	23	11.2	16	29	0.67	6.90	84.4	0.01	0.07	0.02	155.3	0.09	0.47	0.12
SEP. 24-26/84																				
II	0	369	12	70	64	16	85	15.8	77	93	0.75	4.93	76.4	0.23	7.11	0.24	420.4	1.14	35.03	1.18
III	0	266	77	60	65	0	65	0.0	65	65	1.00	4.98	76.0	0.24	0.84	0.34	323.8	1.22	4.20	1.71
	I				1	0	1	0.0	1	1	1.00	11.45	101.0	0.00	0.01	0.01	11.4	0.04	0.15	0.06
IV	0	360	98	55	103	8	112	0.9	110	114	0.92	3.49	67.9	0.31	1.14	0.43	389.9	1.08	3.98	1.49
	I				1	0	1	0.0	1	1	1.00	6.35	83.0	0.00	0.01	0.00	6.4	0.02	0.06	0.02
V	0	284	96	68	36	4	41	0.8	39	42	0.89	4.19	72.6	0.14	0.42	0.22	169.6	0.60	1.77	0.90
	I				2	1	4	12.0	-3	11	0.50	10.34	97.3	0.01	0.04	0.02	41.3	0.15	0.43	0.22
VI	0	256	89	49	47	2	49	0.1	48	50	0.96	4.59	74.1	0.19	0.55	0.29	225.6	0.88	2.53	1.35
	I				4	3	16	1008.0	-47	79	0.25	7.59	88.0	0.06	0.18	0.10	121.5	0.47	1.36	0.73
VIII	0	344	152	76	20	2	22	0.3	21	23	0.90	5.69	79.4	0.06	0.15	0.12	126.4	0.37	0.83	0.66
	I				3	0	3	0.0	3	3	1.00	6.36	83.0	0.01	0.02	0.02	19.1	0.06	0.13	0.10
ALL	0	1879	524	378	335	32	370	5.0	366	375	0.90	4.42	73.2	0.20	0.71	0.27	1638.1	0.87	3.13	1.21
	I				11	4	17	12.1	10	24	0.64	8.07	89.4	0.01	0.03	0.01	139.5	0.07	0.27	0.10

APPENDIX TABLE II. CARNATION CREEK RAINBOW TROUT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 24-27/83																				
ALL	I	1895	314	355	15	6	25	25.9	15	35	0.60	7.41	89.5	0.01	0.08	0.02	185.2	0.10	0.59	0.12
	II				5	2	8	8.6	2	14	0.60	20.97	127.9	0.00	0.03	0.01	174.8	0.09	0.56	0.11
JULY 26-28/83																				
ALL	0	1956	263	358	26	5	32	2.7	29	35	0.81	1.11	48.1	0.02	0.12	0.02	35.8	0.02	0.14	0.02
	I				7	3	12	17.2	4	21	0.57	10.16	99.1	0.01	0.05	0.01	124.4	0.06	0.47	0.07
	II				7	2	10	2.8	6	13	0.71	21.19	127.6	0.01	0.04	0.01	207.7	0.11	0.79	0.12
SEP. 19-22/83																				
ALL	0	1956	263	358	25	3	28	0.7	27	30	0.88	3.03	66.2	0.01	0.11	0.02	86.1	0.04	0.33	0.05
	I				9	5	20	110.7	-1	41	0.44	12.84	110.5	0.01	0.08	0.01	259.9	0.13	0.99	0.15
	II				7	1	8	0.3	7	9	0.86	26.52	137.4	0.00	0.03	0.00	216.6	0.11	0.82	0.13

APPENDIX TABLE II. CARNATION CREEK RAINBOW TROUT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 28-30/84																				
ALL	I	2329	1051	397	5	1	6	0.6	5	8	0.80	8.49	93.2	0.00	0.01	0.00	53.0	0.02	0.05	0.04
	II				2	0	2	0.0	2	2	1.00	14.58	112.5	0.00	0.00	0.00	29.2	0.01	0.03	0.02
JULY 24-26/84																				
II	I	335	15	71	1	0	1	0.0	1	1	1.00	15.65	114.0	0.00	0.07	0.00	15.6	0.05	1.04	0.05
III	0	226	55	56	3	0	3	0.0	3	3	1.00	1.99	62.0	0.01	0.05	0.02	6.0	0.03	0.11	0.03
IV	0	277	38	53	53	19	83	54.6	68	97	0.64	1.21	49.5	0.30	2.17	0.35	99.6	0.36	2.62	0.42
V	0	258	69	68	15	4	20	4.7	16	25	0.73	1.49	53.7	0.08	0.30	0.11	30.5	0.12	0.44	0.16
	I				1	0	1	0.0	1	1	1.00	9.07	98.0	0.00	0.01	0.01	9.1	0.04	0.13	0.05
VI	0	191	30	52	28	7	37	6.9	32	43	0.75	0.60	36.3	0.20	1.24	0.23	22.5	0.12	0.75	0.14
	I				0	1						12.05	106.0							
VIII	0	354	123	100	12	3	16	3.0	13	19	0.75	1.60	55.9	0.05	0.13	0.07	25.6	0.07	0.21	0.11
	I				1	0	1	0.0	1	1	1.00	7.80	94.0	0.00	0.01	0.00	7.8	0.02	0.06	0.03
ALL	0	1641	330	400	111	33	158	52.2	144	172	0.70	1.15	47.8	0.10	0.48	0.12	182.3	0.11	0.55	0.14
	I				3	1	5	2.3	2	8	0.67	11.95	105.7	0.00	0.01	0.00	53.8	0.03	0.16	0.04
SEP. 24-26/84																				
II	0	369	12	70	1	0	1	0.0	1	1	1.00	6.95	92.0	0.00	0.08	0.00	6.9	0.02	0.58	0.02
	I				1	0	1	0.0	1	1	1.00	18.90	121.0	0.00	0.08	0.00	18.9	0.05	1.57	0.05
III	0	266	77	60	2	0	2	0.0	2	2	1.00	4.00	68.5	0.01	0.03	0.01	8.0	0.03	0.10	0.04
	I				2	0	2	0.0	2	2	1.00	19.88	12.3	0.01	0.03	0.01	39.8	0.15	0.52	0.21
IV	0	360	98	55	37	7	46	3.6	42	49	0.81	3.14	66.8	0.13	0.47	0.17	143.2	0.40	1.46	0.55
	I				1	0	1	0.0	1	1	1.00	11.10	105.0	0.00	0.01	0.00	11.1	0.03	0.11	0.04
V	0	284	96	68	35	5	41	1.5	38	43	0.86	4.13	73.4	0.14	0.43	0.22	168.8	0.59	1.76	0.90
VI	0	256	89	49	45	12	61	14.0	54	69	0.73	1.97	56.2	0.24	0.69	0.37	121.0	0.47	1.36	0.72
	I				2	0	2	0.0	2	2	1.00	18.41	121.0	0.01	0.02	0.01	36.8	0.14	0.41	0.22
VIII	0	344	152	76	14	5	22	14.2	14	29	0.64	4.98	78.0	0.06	0.14	0.11	108.5	0.32	0.71	0.57
	I				1	0	1	0.0	1	1	1.00	17.55	117.0	0.00	0.01	0.01	17.5	0.05	0.12	0.09
	II				1	0	1	0.0	1	1	1.00	21.35	128.0	0.00	0.01	0.01	21.4	0.06	0.14	0.11
ALL	0	1879	524	378	134	29	171	20.3	162	180	0.78	3.22	66.2	0.09	0.33	0.13	551.3	0.29	1.05	0.41
	I				7	0	7	0.0	7	7	1.00	17.73	87.1	0.00	0.01	0.01	124.1	0.07	0.24	0.09
	II				1	0	1	0.0	1	1	1.00	21.35	128.0	0.00	0.00	0.00	21.4	0.01	0.04	0.02

APPENDIX TABLE III. CARNATION CREEK CUTTHROAT TROUT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 24-27/83																				
ALL	I	1895	314	355	5	0	5	0.0	5	5	1.00	7.09	87.4	0.00	0.02	0.00	35.4	0.02	0.11	0.02
	II				7	2	10	2.8	6	13	0.71	27.15	139.2	0.01	0.03	0.01	266.1	0.14	0.85	0.17
	III				0	1						51.46	176.0							
JULY 26-28/83																				
ALL	I	1956	263	358	11	2	13	1.0	11	15	0.82	9.23	97.1	0.01	0.05	0.01	124.1	0.06	0.47	0.07
	II				6	2	9	4.5	5	13	0.67	25.03	136.6	0.00	0.03	0.01	225.3	0.12	0.86	0.13
	III				1	1						78.08	203.5							
SEP. 19-22/83																				
ALL	I	1956	263	358	12	1	13	0.1	12	14	0.92	8.94	96.8	0.01	0.05	0.01	117.1	0.06	0.45	0.07
	II				6	3	12	36.0	0	24	0.50	33.59	147.7	0.01	0.05	0.01	403.0	0.21	1.53	0.24
MAY 28-30/84																				
ALL	I	2329	1051	397	1	1						8.80	96.0							
	II				2	1	4	12.0	-3	11	0.50	16.70	120.0	0.00	0.00	0.00	66.8	0.03	0.06	0.05
	III				0	1						63.05	178.0							
JULY 24-26/84																				
ALL	I	1641	330	400	11	2	13	1.0	11	15	0.82	11.25	103.1	0.01	0.04	0.01	151.2	0.09	0.46	0.12
	II				1	0	1	0.0	1	1	1.00	67.20	195.0	0.00	0.00	0.00	67.2	0.04	0.20	0.05
SEP. 24-26/84																				
ALL	I	1879	524	378	8	1	9	0.2	8	10	0.88	14.67	112.3	0.00	0.02	0.01	134.1	0.07	0.26	0.10
	II				2	0	2	0.0	2	2	1.00	69.33	193.0	0.00	0.00	0.00	138.7	0.07	0.26	0.10

APPENDIX TABLE IV. CARNATION CREEK COTTUS ALEUTICUS.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 24-27/83																				
II	ALL	395	26	65	96	55	225	1489.7	148	302	0.43	2.16	57.6	0.57	8.65	0.61	485.8	1.23	18.68	1.32
III	ALL	245	28	52	12	3	16	3.0	13	19	0.75	5.49	76.7	0.07	0.57	0.07	87.9	0.36	3.14	0.41
IV	ALL	399	97	58	10	10						8.23	88.2							
V	ALL	207	44	53	11	5	20	37.3	8	32	0.55	8.16	89.8	0.10	0.46	0.12	164.5	0.79	3.74	1.01
VI	ALL	426	73	57	4	3	16	1008.0	-47	79	0.25	8.69	92.6	0.04	0.22	0.05	139.0	0.33	1.90	0.39
VIII	ALL	223	46	70	20	6	29	9.7	22	35	0.70	7.60	89.4	0.13	0.62	0.16	217.2	0.97	4.72	1.23
ALL	ALL	1895	314	355	153	82	330	1455.6	253	406	0.46	4.01	67.7	0.17	1.05	0.21	1320.5	0.70	4.21	0.84
JULY 26-28/83																				
II	ALL	434	13	69	75	37	148	413.6	107	189	0.51	2.67	60.5	0.34	11.39	0.35	395.7	0.91	30.44	0.94
III	ALL	239	23	52	3	2	9	180.0	-18	36	0.33	4.27	69.4	0.04	0.39	0.04	38.5	0.16	1.67	0.18
IV	ALL	396	70	58	19	5	26	5.6	21	31	0.74	4.33	68.7	0.07	0.37	0.08	111.6	0.28	1.59	0.34
V	ALL	238	36	49	14	4	20	5.6	15	24	0.71	5.92	76.8	0.08	0.54	0.10	116.0	0.49	3.22	0.57
VI	ALL	359	84	63	8	10						6.09	76.5							
VIII	ALL	290	37	67	12	8	36	720.0	-18	90	0.33	6.55	81.6	0.12	0.97	0.14	235.8	0.81	6.37	0.93
ALL	ALL	1956	263	358	131	66	264	825.0	207	321	0.50	3.92	66.8	0.13	1.00	0.16	1034.3	0.53	3.93	0.61
SEP. 19-22/83																				
II	ALL	434	13	69	85	60	289	9654.9	92	486	0.29	2.31	59.7	0.67	22.23	0.69	667.3	1.54	51.33	1.59
III	ALL	239	23	52	11	5	20	37.3	8	32	0.55	4.10	71.6	0.08	0.88	0.09	82.6	0.35	3.59	0.38
IV	ALL	396	70	58	22	15	69	1678.2	-13	151	0.32	4.98	76.0	0.17	0.99	0.21	344.1	0.87	4.92	1.06
V	ALL	238	36	49	13	6	24	48.1	10	38	0.54	6.39	79.8	0.10	0.67	0.12	154.2	0.65	4.28	0.76
VI	ALL	359	84	63	12	7	29	214.5	0	58	0.42	5.04	73.8	0.08	0.34	0.10	145.2	0.40	1.73	0.53
VIII	ALL	290	37	67	7	3	12	17.2	4	21	0.57	7.09	84.0	0.04	0.33	0.05	86.9	0.30	2.35	0.34
ALL	ALL	1956	263	358	150	96	417	5999.1	262	572	0.36	3.55	66.6	0.21	1.58	0.25	1477.9	0.76	5.62	0.87

APPENDIX TABLE IV. CARNATION CREEK COTTUS ALEUTICUS.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 28-30/84																				
II	ALL	473	126	73	46	22	88	209.9	59	117	0.52	3.26	65.6	0.19	0.70	0.25	287.2	0.61	2.28	0.83
III	ALL	295	116	55	6	2	9	4.5	5	13	0.67	7.01	83.6	0.03	0.08	0.05	63.1	0.21	0.54	0.35
IV	ALL	446	171	53	14	6	25	34.5	13	36	0.57	7.55	86.7	0.05	0.14	0.09	185.0	0.41	1.08	0.67
V	ALL	326	154	66	2	4						5.53	78.3							
VI	ALL	279	142	52	8	1	9	0.2	8	10	0.88	5.90	78.2	0.03	0.06	0.07	53.9	0.19	0.38	0.39
VIII	ALL	510	342	98	3	2	9	180.0	-18	36	0.33	10.28	98.4	0.02	0.03	0.05	92.5	0.18	0.27	0.55
ALL	ALL	2329	1051	397	79	37	149	318.5	113	184	0.53	4.95	74.0	0.06	0.14	0.12	735.7	0.32	0.70	0.58
JULY 24-26/84																				
II	ALL	335	15	71	47	12	63	12.5	56	70	0.74	3.92	69.8	0.19	4.21	0.20	247.5	0.74	16.50	0.77
III	ALL	226	55	56	8	6	32	2016.0	-58	122	0.25	5.56	75.8	0.14	0.58	0.19	178.0	0.79	3.24	1.04
IV	ALL	277	38	53	19	13	60	1506.4	-17	138	0.32	6.10	78.3	0.22	1.58	0.25	367.1	1.33	9.66	1.54
V	ALL	258	69	68	30	13	53	78.3	35	71	0.57	5.79	78.9	0.21	0.77	0.28	306.3	1.19	4.44	1.62
VI	ALL	191	30	52	11	3	15	3.7	11	19	0.73	6.75	82.8	0.08	0.50	0.09	102.1	0.53	3.40	0.63
VIII	ALL	354	123	100	20	6	29	9.7	22	35	0.70	6.77	83.0	0.08	0.23	0.12	193.4	0.55	1.57	0.84
ALL	ALL	1641	330	400	135	53	222	212.9	193	251	0.61	5.45	76.6	0.14	0.67	0.17	1210.3	0.74	3.67	0.92
SEP. 24-26/84																				
II	ALL	369	12	70	45	13	63	18.9	55	72	0.71	4.12	70.4	0.17	5.27	0.18	260.8	0.71	21.74	0.73
III	ALL	266	77	60	14	5	22	14.2	14	29	0.64	6.07	78.7	0.08	0.28	0.12	132.2	0.50	1.72	0.70
IV	ALL	360	98	55	9	11						7.35	83.8							
V	ALL	284	96	68	19	7	30	22.2	21	40	0.63	6.66	82.4	0.11	0.31	0.16	200.4	0.71	2.09	1.07
VI	ALL	256	89	49	8	8						9.56	91.9							
VIII	ALL	344	152	76	12	4	18	9.0	12	24	0.67	9.65	92.0	0.05	0.12	0.09	173.7	0.50	1.14	0.90
ALL	ALL	1879	524	378	107	48	194	337.4	157	231	0.55	6.53	80.3	0.10	0.37	0.14	1266.5	0.67	2.42	0.93

APPENDIX TABLE V. CARNATION CREEK COTTUS ASPER.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 24-27/83																				
II	ALL	395	26	65	11	8	40	1816.5	-45	126	0.27	13.98	97.6	0.10	1.55	0.11	563.7	1.43	21.68	1.53
JULY 26-28/83																				
II	ALL	434	13	69	11	7	30	416.9	-11	71	0.36	8.87	91.0	0.07	2.33	0.07	268.3	0.62	20.64	0.64
SEP. 19-22/83																				
II	ALL	434	13	69	15	4	20	4.7	16	25	0.73	9.02	90.2	0.05	1.57	0.05	184.5	0.43	14.19	0.44
MAY 28-30/84																				
II	ALL	473	126	73	14	2	16	0.6	15	18	0.86	9.49	93.4	0.03	0.13	0.05	155.0	0.33	1.23	0.45
III	ALL	295	116	55	2	1	4	12.0	-3	11	0.50	18.35	116.3	0.01	0.03	0.02	73.4	0.25	0.63	0.41
IV	ALL	446	171	53	2	0	2	0.0	2	2	1.00	25.39	125.5	0.00	0.01	0.01	50.8	0.11	0.30	0.18
VI	ALL	279	142	52	1	0	1	0.0	1	1	1.00	5.49	81.0	0.00	0.01	0.01	5.5	0.02	0.04	0.04
JULY 24-26/84																				
II	ALL	335	15	71	13	4	19	7.0	13	24	0.69	9.91	93.9	0.06	1.25	0.06	186.2	0.56	12.41	0.58
III	ALL	226	55	56	1	0	1	0.0	1	1	1.00	25.83	130.0	0.00	0.02	0.01	25.8	0.11	0.47	0.15
IV	ALL	277	38	53	2	1	4	12.0	-3	11	0.50	29.46	133.7	0.01	0.11	0.02	117.8	0.43	3.10	0.49
SEP. 24-26/84																				
II	ALL	369	12	70	10	5	20	60.0	5	35	0.50	10.95	97.2	0.05	1.67	0.06	219.1	0.59	18.26	0.61
III	ALL	266	77	60	5	1	6	0.6	5	8	0.80	18.91	118.2	0.02	0.08	0.03	118.2	0.44	1.53	0.63
V	ALL	284	96	68	1	0	1	0.0	1	1	1.00	8.51	90.0	0.00	0.01	0.01	8.5	0.03	0.09	0.05

APPENDIX TABLE VI. CARNATION CREEK TRIBUTARY C CUTTHROAT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
JUNE 1/83																				
I	0	96	56	51	1	3						0.15	22.3							
	I				8	3	13	10.1	6	19	0.63	4.49	76.5	0.13	0.23	0.32	57.4	0.60	1.03	1.44
	II				11	1	12	0.1	11	13	0.91	14.81	114.5	0.13	0.22	0.30	179.2	1.87	3.20	4.48
	III				3	0	3	0.0	3	3	1.00	63.50	177.3	0.03	0.05	0.08	190.5	1.98	3.40	4.76
SEP. 21/83																				
I	0	86	44	50	21	3	25	0.9	23	26	0.86	2.22	60.0	0.28	0.56	0.58	54.5	0.63	1.24	1.30
	I				7	3	12	17.2	4	21	0.57	7.26	91.4	0.14	0.28	0.29	89.0	1.03	2.02	2.12
	II				6	0	6	0.0	6	6	1.00	14.64	116.8	0.07	0.14	0.14	87.8	1.02	2.00	2.09
	III				2	0	2	0.0	2	2	1.00	45.07	165.0	0.02	0.05	0.05	90.1	1.05	2.05	2.15
JUNE 1/84																				
I	0	141	82	57	3	0	3	0.0	3	3	1.00	0.13	26.0	0.02	0.04	0.05	0.4	0.00	0.00	0.01
	I				3	0	3	0.0	3	3	1.00	5.82	82.3	0.02	0.04	0.05	17.5	0.12	0.21	0.30
	II				2	0	2	0.0	2	2	1.00	21.95	128.5	0.01	0.02	0.03	43.9	0.31	0.54	0.74
	III				1	0	1	0.0	1	1	1.00	52.45	174.0	0.01	0.01	0.02	52.5	0.37	0.64	0.89
SEP. 24/84																				
I	0	117	68	57	43	10	56	8.3	50	62	0.77	1.41	51.9	0.48	0.82	1.14	79.0	0.68	1.16	1.61
	I				5	1	6	0.6	5	8	0.80	7.12	90.7	0.05	0.09	0.13	44.5	0.38	0.65	0.91
	II				4	0	4	0.0	4	4	1.00	27.32	138.3	0.03	0.06	0.08	109.3	0.93	1.61	2.23
	III				1	0	1	0.0	1	1	1.00	103.75	223.0	0.01	0.01	0.02	103.8	0.89	1.53	2.12

APPENDIX TABLE VII UPPER CARNATION(IX) CUTTHROAT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
MAY 31/83																				
IX	I	314	66	67	28	17	71	696.4	18	124	0.39	2.80	64.8	0.23	1.08	0.29	199.3	0.63	3.02	0.80
	II				29	14	56	140.0	32	80	0.52	12.13	106.6	0.18	0.85	0.23	680.0	2.17	10.30	2.74
	III				2	0	2	0.0	2	2	1.00	33.02	148.5	0.01	0.03	0.01	66.0	0.21	1.00	0.27
SEP. 15/83																				
IX	0	314	66	67	73	24	109	51.6	94	123	0.67	0.90	45.8	0.35	1.65	0.44	98.3	0.31	1.49	0.40
	I				34	7	43	4.4	39	47	0.79	5.15	81.6	0.14	0.65	0.17	220.7	0.70	3.34	0.89
	II				15	6	25	25.9	15	35	0.60	14.92	113.3	0.08	0.38	0.10	373.0	1.19	5.65	1.50
	III				1	1						37.49	152.5							
MAY 31/84																				
IX	I	309	90	75	34	13	55	47.2	41	69	0.62	4.15	71.8	0.18	0.61	0.25	228.2	0.74	2.54	1.04
	II				11	10	121	254100	-887	1129	0.09	17.95	122.8	0.39	1.34	0.55	2171.8	7.03	24.13	9.92
SEP. 27/84																				
IX	0	245	60	75	31	7	40	5.4	35	45	0.77	1.08	47.3	0.16	0.67	0.22	43.0	0.18	0.72	0.23
	I				35	14	58	60.5	43	74	0.60	6.67	86.8	0.24	0.97	0.32	388.8	1.59	6.48	2.10
	II				8	1	9	0.2	8	10	0.88	22.88	130.9	0.04	0.15	0.05	209.2	0.85	3.49	1.13

APPENDIX TABLE VIII. USELESS CREEK COHO

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	0	179	82	52	2	1	4	12.0	-3	11	0.50	2.68	62.7	0.02	0.05	0.04	10.7	0.06	0.13	0.11
AUG. 29/84																				
I	0	164	89	52	1	0	1	0.0	1	1	1.00	3.40	68.0	0.01	0.01	0.01	3.4	0.02	0.04	0.05

APPENDIX TABLE VIII. USELESS CREEK CUTTHROAT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	0	179	82	52	3	2	9	180.0	-18	36	0.33	1.17	48.0	0.05	0.11	0.09	10.6	0.06	0.13	0.11
	I				8	4	16	48.0	2	30	0.50	5.86	85.3	0.09	0.20	0.16	93.8	0.52	1.14	0.97
	II				2	4						16.79	122.5							
	III				2	0	2	0.0	2	2	1.00	54.03	177.5	0.01	0.02	0.02	108.1	0.60	1.32	1.11
AUG. 29/84																				
I	0	164	89	52	9	3	14	6.7	8	19	0.67	1.43	52.8	0.08	0.15	0.18	19.3	0.12	0.22	0.26
	I				7	2	10	2.8	6	13	0.71	7.07	89.1	0.06	0.11	0.13	69.3	0.42	0.78	0.92
	II				6	0	6	0.0	6	6	1.00	26.70	139.5	0.04	0.07	0.08	160.2	0.98	1.80	2.14

APPENDIX TABLE VIII. USELESS CREEK COTTUS ALEUTICUS.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	ALL	179	82	52	39	10	52	10.5	46	59	0.74	4.22	68.0	0.29	0.64	0.54	221.3	1.24	2.70	2.28
AUG. 29/84																				
I	ALL	154	89	52	26	8	38	14.0	30	45	0.69	4.15	71.8	0.23	0.42	0.50	156.0	0.95	1.75	2.08

APPENDIX TABLE VIII. USELESS CREEK COTTUS ASPER.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 29/84																				
I	ALL	164	89	52	2	2						9.49	95.0							

APPENDIX TABLE IX. PACHENA CREEK COHO.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	0	311	15	61	193	10	204	0.7	202	205	0.95	1.62	53.5	0.65	13.57	0.69	329.5	1.06	21.97	1.11
	I				31	0	31	0.0	31	31	1.00	6.66	85.1	0.10	2.07	0.10	206.5	0.66	13.77	0.70
AUG. 28/84																				
I	0	306	12	64	224	8	232	0.3	231	233	0.96	2.47	60.3	0.76	19.36	0.79	573.5	1.87	47.79	1.95
	I				7	0	7	0.0	7	7	1.00	7.45	89.0	0.02	0.58	0.02	52.1	0.17	4.34	0.18

APPENDIX TABLE IX. PACHENA CREEK RAINBOW.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	0	311	15	61	9	2	12	1.5	9	14	0.78	1.41	53.6	0.04	0.77	0.04	16.3	0.05	1.09	0.06
	I				3	0	3	0.0	3	3	1.00	9.37	100.3	0.01	0.20	0.01	28.1	0.09	1.87	0.09
	III				1	0	1	0.0	1	1	1.00	83.66	201.0	0.00	0.07	0.00	83.7	0.27	5.58	0.28
AUG. 28/84																				
I	0	306	12	64	72	4	76	0.3	75	77	0.94	1.31	50.3	0.25	6.35	0.26	99.6	0.33	8.30	0.34
	I				2	0	2	0.0	2	2	1.00	13.01	110.0	0.01	0.17	0.01	26.0	0.09	2.17	0.09

APPENDIX TABLE IX. PACHENA CREEK CUTTHROAT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 28/84																				
I	0	306	12	64	8	6	32	2016.0	-58	122	0.25	1.22	51.0	0.10	2.67	0.11	38.9	0.13	3.25	0.13
	I				2	0	2	0.0	2	2	1.00	10.47	99.5	0.01	0.17	0.01	20.9	0.07	1.74	0.07
	II				1	0	1	0.0	1	1	1.00	73.85	198.0	0.00	0.08	0.00	73.8	0.24	6.15	0.25

APPENDIX TABLE IX. PACHENA CREEK COTTUS ALEUTICUS.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	ALL	311	15	61	46	26	106	643.7	55	157	0.43	2.44	62.0	0.34	7.05	0.36	258.5	0.83	17.23	0.87
AUG. 28/84																				
I	ALL	306	12	64	45	13	63	18.9	55	72	0.71	3.80	70.2	0.21	5.27	0.22	240.5	0.79	20.04	0.82

APPENDIX TABLE IX. PACHENA CREEK COTTUS ASPER.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 24/83																				
I	ALL	311	15	61	51	17	77	38.3	64	89	0.67	6.62	81.6	0.25	5.10	0.26	506.6	1.63	33.77	1.71
AUG. 28/84																				
I	ALL	306	12	64	30	6	38	3.5	34	41	0.80	10.08	91.9	0.12	3.13	0.13	377.9	1.23	31.49	1.29

APPENDIX TABLE X. RITHERDON CREEK CUTTHROAT.

SEC	AGE	AREA (SQ.M) WET	AREA (SQ.M) RIF	SEC LEN (M)	C1	C2	POP N	VAR N	95 % CONF LIM LOW	95 % CONF LIM UP	P	MEAN WT (GM)	MEAN LEN (MM)	DENSITY FISH/SQ.M WET	DENSITY FISH/SQ.M RIF	DENSITY FISH/SQ.M POOL	WETTED TOT WT (GM)	GM./SQ.M WET	GM./SQ.M RIF	GM./SQ.M POOL
AUG. 25/83																				
I	0	245	10	56	12	4	18	9.0	12	24	0.67	1.04	48.0	0.07	1.80	0.08	18.8	0.08	1.88	0.08
	I				10	3	14	4.9	10	19	0.70	11.14	104.5	0.06	1.43	0.06	159.2	0.65	15.92	0.68
	II				10	1	11	0.2	10	12	0.90	38.60	155.0	0.05	1.11	0.05	428.9	1.75	42.89	1.83
	III				1	0	1	0.0	1	1	1.00	57.88	194.0	0.00	0.10	0.00	57.9	0.24	5.79	0.25
AUG. 29/84																				
I	0	246	26	57	30	15	60	180.0	33	87	0.50	1.06	46.9	0.24	2.31	0.27	63.4	0.26	2.44	0.29
	I				10	1	11	0.2	10	12	0.90	11.17	102.6	0.05	0.43	0.05	124.1	0.50	4.77	0.56
	II				5	0	5	0.0	5	5	1.00	33.63	154.8	0.02	0.19	0.02	168.2	0.68	6.47	0.76

APPENDIX TABLE XI. FISH LENGTH DATA FOR CARNATION CREEK AND OTHER AREA STREAMS.

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
83 Mar 20	FENC	TR	CHUM	0	45	43.36	0.773	43.12	43.59	42	45
83 Mar 24	FENC	TR	CHUM	0	50	43.54	0.676	43.35	43.73	42	45
83 Mar 16	FENC	TR	COHO	0	57	35.68	0.890	35.45	35.92	32	38
83 Mar 26	FENC	TR	COHO	0	49	37.41	1.079	37.10	37.72	34	40
83 Mar 31	FENC	TR	COHO	0	50	37.40	1.161	37.07	37.73	33	39
83 Apr 08	FENC	TR	COHO	0	50	37.50	2.628	36.75	38.25	31	40
83 May 10	FENC	TR	COHO	0	55	37.51	3.661	36.52	38.50	32	48
83 Jun 10	FENC	TR	COHO	0	55	44.09	4.975	42.75	45.43	36	54
83 Jun 12	FENC	TR	COHO	0	38	42.84	4.618	41.33	44.36	35	54
83 Jun 16	FENC	TR	COHO	0	80	46.79	5.083	45.66	47.92	37	62
83 Jun 29	FENC	TR	COHO	0	27	49.26	4.311	47.55	50.97	42	59
83 Jul 16	FENC	TR	COHO	0	140	51.02	3.771	50.40	51.65	41	61
83 Mar 09	FENC	TR	COHO	1	5	82.60	7.635	73.11	92.09	77	94
83 Mar 16	FENC	TR	COHO	1	25	77.08	7.571	73.96	80.20	60	95
83 Mar 23	FENC	TR	COHO	1	75	78.48	8.655	76.49	80.47	60	107
83 Mar 30	FENC	TR	COHO	1	172	79.56	7.295	78.47	80.65	63	103
83 Apr 06	FENC	TR	COHO	1	242	80.31	7.462	79.37	81.25	62	100
83 Apr 13	FENC	TR	COHO	1	319	84.50	9.108	83.51	85.50	65	110
83 Apr 20	FENC	TR	COHO	1	515	87.56	9.039	86.77	88.34	62	110
83 Apr 27	FENC	TR	COHO	1	888	87.99	8.695	87.42	88.57	65	111
83 May 04	FENC	TR	COHO	1	537	87.92	8.282	87.22	88.62	66	110
83 May 11	FENC	TR	COHO	1	281	87.49	7.178	86.65	88.33	66	110
83 May 18	FENC	TR	COHO	1	124	86.58	8.214	85.13	88.03	65	107
83 May 25	FENC	TR	COHO	1	45	85.29	6.010	83.49	87.09	72	97
83 Jun 01	FENC	TR	COHO	1	21	84.62	6.637	81.59	87.65	70	97
83 Mar 16	FENC	TR	COHO	2	2	99.50	3.536	67.72	131.28	97	102
83 Mar 23	FENC	TR	COHO	2	6	93.83	9.496	83.87	103.80	84	107
83 Mar 30	FENC	TR	COHO	2	10	94.50	5.836	90.33	98.67	87	104
83 Apr 06	FENC	TR	COHO	2	17	106.24	6.408	102.94	109.53	98	120
83 Apr 13	FENC	TR	COHO	2	19	104.32	6.558	101.16	107.48	94	118
83 Apr 20	FENC	TR	COHO	2	81	101.69	10.460	99.38	104.00	88	126
83 Apr 27	FENC	TR	COHO	2	113	104.35	7.770	102.90	105.79	91	135
83 May 04	FENC	TR	COHO	2	53	101.70	6.580	99.89	103.51	93	117
83 May 11	FENC	TR	COHO	2	12	110.75	5.083	107.52	113.98	103	118
83 May 27	2	SPS	COHO	0	311	45.50	4.934	44.95	46.05	34	64
83 May 27	2	SPS	COHO	1	5	76.60	6.427	68.61	84.59	71	84
83 May 24	3	SPS	COHO	0	259	43.93	5.419	43.27	44.59	33	64
83 May 24	3	SPS	COHO	1	7	77.57	6.133	71.89	83.25	68	88
83 May 25	4	SPS	COHO	0	428	45.14	5.223	44.65	45.63	33	63
83 May 25	4	SPS	COHO	1	11	74.55	4.132	71.77	77.32	68	81
83 May 25	5	SPS	COHO	0	123	46.24	4.700	45.41	47.07	35	62
83 May 25	5	SPS	COHO	1	7	79.71	8.751	71.61	87.82	71	92
83 May 26	6	SPS	COHO	0	385	41.85	3.540	41.50	42.20	33	58
83 May 26	6	SPS	COHO	1	3	68.33	3.055	60.75	75.92	65	71
83 May 26	8	SPS	COHO	0	369	42.64	3.748	42.26	43.03	38	65
83 May 26	8	SPS	COHO	1	1	69.00					

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
83 Jul 28	2	SPS	COHO	0	245	57.23	6.582	56.41	58.06	43	79
83 Jul 28	2	SPS	COHO	1	3	80.00	3.606	71.05	88.95	77	84
83 Jul 26	3	SPS	COHO	0	153	60.29	7.939	59.04	61.55	42	81
83 Jul 26	3	SPS	COHO	1	6	87.50	7.791	79.33	95.67	78	96
83 Jul 26	4	SPS	COHO	0	321	57.94	7.235	57.15	58.74	37	78
83 Jul 26	4	SPS	COHO	1	9	85.44	7.907	79.36	91.53	80	106
83 Jul 27	5	SPS	COHO	0	162	58.66	7.440	57.51	59.81	38	81
83 Jul 27	5	SPS	COHO	1	6	84.17	4.446	79.50	88.83	81	93
83 Jul 27	6	SPS	COHO	0	219	56.89	6.766	55.99	57.78	45	84
83 Jul 27	6	SPS	COHO	1	2	84.00	1.414	71.29	96.71	83	85
83 Jul 27	8	SPS	COHO	0	210	56.05	6.664	55.15	56.95	42	79
83 Jul 27	8	SPS	COHO	1	4	87.50	2.380	83.72	91.28	84	89
83 Sep 22	2	SPS	COHO	0	219	60.57	7.384	59.59	61.54	47	82
83 Sep 22	2	SPS	COHO	1	4	92.50	3.416	87.07	97.93	89	97
83 Sep 19	3	SPS	COHO	0	136	64.38	7.458	63.13	65.64	50	84
83 Sep 19	3	SPS	COHO	1	4	88.75	3.304	83.50	94.00	85	93
83 Sep 20	4	SPS	COHO	0	262	60.94	7.063	60.09	61.80	45	80
83 Sep 20	4	SPS	COHO	1	10	87.90	4.864	84.42	91.38	82	95
83 Sep 20	5	SPS	COHO	0	144	61.61	6.809	60.50	62.72	45	77
83 Sep 20	5	SPS	COHO	1	7	85.71	3.988	82.02	89.41	82	94
83 Sep 21	6	SPS	COHO	0	192	59.84	6.105	58.98	60.70	48	80
83 Sep 21	6	SPS	COHO	1	2	86.00	0.000	86.00	86.00	86	86
83 Sep 21	8	SPS	COHO	0	199	59.36	7.183	58.36	60.36	41	83
83 Sep 21	8	SPS	COHO	1	2	89.50	2.121	70.43	108.57	88	91
83 Sep 12	125	PS	COHO	0	64	58.72	5.846	57.26	60.17	49	74
83 Sep 12	225	PS	COHO	0	63	60.29	6.757	58.59	61.98	49	79
83 Sep 12	225	PS	COHO	1	2	84.50	0.707	78.15	90.86	84	85
83 Sep 12	525	PS	COHO	0	82	61.98	4.996	60.88	63.07	52	79
83 Sep 12	625	PS	COHO	0	92	65.12	7.840	63.50	66.74	50	83
83 Sep 12	675	PS	COHO	0	54	64.41	8.055	62.22	66.60	49	82
83 Sep 12	675	PS	COHO	1	4	93.75	3.862	87.61	99.89	90	98
83 Sep 13	775	PS	COHO	0	51	61.88	7.028	59.90	63.86	51	79
83 Sep 13	900	PS	COHO	0	153	61.78	7.270	60.63	62.94	49	82
83 Sep 13	900	PS	COHO	1	2	90.50	4.950	46.01	134.99	87	94
83 Sep 13	975	PS	COHO	0	122	60.89	7.089	59.63	62.14	40	80
83 Sep 13	1025	PS	COHO	0	108	62.05	6.449	60.82	63.28	47	81
83 Sep 13	1025	PS	COHO	1	2	87.00	1.414	74.29	99.71	86	88
83 Sep 13	1150	PS	COHO	0	154	61.43	7.142	60.30	62.56	45	81
83 Sep 13	1150	PS	COHO	1	1	85.00					
83 Jun 01	1200	S	COHO	0	62	43.94	5.037	42.66	45.21	33	57

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
83 Sep 13	1400	PS	COHO	0	154	60.12	6.714	59.06	61.18	45	79
83 Sep 13	1400	PS	COHO	1	1	96.00					
83 Sep 13	1475	PS	COHO	0	142	58.15	5.920	57.17	59.12	47	78
83 Sep 13	1525	PS	COHO	0	223	58.75	6.739	57.87	59.64	44	79
83 Sep 13	1525	PS	COHO	1	1	90.00					
83 Jun 01	1600	S	COHO	0	22	58.86	4.882	56.70	61.03	51	67
83 Jun 01	1600	S	COHO	1	27	85.37	8.340	82.06	88.68	71	97
83 Sep 14	1635	PS	COHO	0	203	59.84	5.920	59.03	60.66	46	80
83 Sep 14	1635	PS	COHO	1	2	93.00	4.243	54.87	131.13	90	96
83 Sep 14	1755	PS	COHO	0	155	62.81	6.439	61.80	63.83	50	79
83 Sep 14	1815	PS	COHO	0	159	62.17	5.953	61.24	63.10	48	80
83 Sep 14	1900	PS	COHO	0	143	61.37	7.167	60.20	62.55	48	78
83 Sep 14	1900	PS	COHO	1	2	84.00	4.243	45.87	122.13	81	87
83 Sep 14	2065	PS	COHO	0	155	63.02	5.540	62.15	63.89	47	77
83 Sep 14	2065	PS	COHO	1	2	86.00	4.243	47.87	124.13	83	89
83 Sep 14	2150	PS	COHO	0	188	63.18	6.957	62.19	64.18	45	81
83 Sep 14	2150	PS	COHO	1	1	91.00					
83 Sep 14	2255	PS	COHO	0	257	59.70	6.600	58.89	60.51	41	79
83 Sep 14	2255	PS	COHO	1	2	87.00	2.828	61.58	112.42	85	89
83 Sep 14	2375	PS	COHO	0	171	58.47	6.958	57.43	59.52	47	82
83 Sep 14	2375	PS	COHO	1	1	90.00					
83 Sep 14	2550	PS	COHO	0	143	59.50	6.309	58.46	60.53	42	77
83 May 26	TOTL	SPS	RBT	1	21	89.52	14.059	83.11	95.94	68	121
83 May 26	TOTL	SPS	RBT	2	7	127.86	12.415	116.36	139.35	105	140
83 Jul 27	TOTL	SPS	RBT	0	31	48.06	5.865	45.92	50.21	40	64
83 Jul 27	TOTL	SPS	RBT	1	10	99.10	7.233	93.93	104.27	85	108
83 Jul 27	TOTL	SPS	RBT	2	9	127.56	11.577	118.64	136.47	113	145
83 Sep 21	TOTL	SPS	RBT	0	28	66.21	8.002	63.11	69.31	43	80
83 Sep 21	TOTL	SPS	RBT	1	14	110.50	9.741	104.88	116.12	90	123
83 Sep 21	TOTL	SPS	RBT	2	8	137.38	13.049	126.49	148.26	124	163
83 May 26	TOTL	SPS	CT	1	5	87.40	10.015	74.95	99.85	74	99
83 May 26	TOTL	SPS	CT	2	9	139.22	16.338	126.64	151.80	114	167
83 May 26	TOTL	SPS	CT	3	1	176.00					
83 Jul 27	TOTL	SPS	CT	1	13	97.08	8.539	91.91	102.24	88	112
83 Jul 27	TOTL	SPS	CT	2	8	136.63	15.874	123.38	149.87	115	156
83 Jul 27	TOTL	SPS	CT	3	2	203.50	24.749	-18.93	425.93	186	221
83 Sep 21	TOTL	SPS	CT	1	13	96.85	12.818	89.10	104.60	85	124
83 Sep 21	TOTL	SPS	CT	2	9	147.67	23.963	129.21	166.12	125	185
83 May 27	2	SPS	ALUT	-	151	57.64	10.763	55.92	59.35	40	85
83 May 24	3	SPS	ALUT	-	15	76.73	18.132	66.71	86.75	56	111
83 May 25	4	SPS	ALUT	-	20	88.15	20.192	78.71	97.59	51	113
83 May 25	5	SPS	ALUT	-	16	89.75	16.679	80.87	98.63	54	115
83 May 26	6	SPS	ALUT	-	7	92.57	14.661	78.99	106.15	69	113
83 May 26	8	SPS	ALUT	-	26	89.42	17.777	82.24	96.60	57	118

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
83 Jul 28	2	SPS	ALUT	-	112	60.49	13.680	57.93	63.05	34	110
83 Jul 26	3	SPS	ALUT	-	5	69.40	18.147	46.84	91.96	55	98
83 Jul 26	4	SPS	ALUT	-	24	68.71	18.485	60.90	76.52	46	110
83 Jul 27	5	SPS	ALUT	-	18	76.83	19.669	67.05	86.62	46	106
83 Jul 27	6	SPS	ALUT	-	18	76.50	22.163	65.48	87.52	46	114
83 Jul 27	8	SPS	ALUT	-	20	81.55	14.791	74.64	88.46	58	114
83 Sep 22	2	SPS	ALUT	-	145	59.68	10.477	57.97	61.38	39	92
83 Sep 19	3	SPS	ALUT	-	16	71.63	15.807	63.21	80.04	53	95
83 Sep 20	4	SPS	ALUT	-	37	75.97	17.816	70.06	81.89	54	112
83 Sep 20	5	SPS	ALUT	-	19	79.79	18.534	70.86	88.72	58	113
83 Sep 21	6	SPS	ALUT	-	19	73.84	15.349	66.45	81.24	58	105
83 Sep 21	8	SPS	ALUT	-	10	84.00	16.586	72.15	95.85	61	109
83 May 27	2	SPS	ASPR	-	19	97.63	30.411	82.98	112.28	66	165
83 Jul 28	2	SPS	ASPR	-	18	91.00	13.810	84.13	97.87	66	116
83 Sep 22	2	SPS	ASPR	-	19	90.21	16.735	82.15	98.27	72	147
83 Jun 01	2100	S	CT	0	4	22.25	0.500	21.45	23.05	22	23
83 Jun 01	2100	S	CT	1	11	76.55	7.202	71.70	81.39	67	91
83 Jun 01	2100	S	CT	2	12	114.50	9.904	108.21	120.79	102	136
83 Jun 01	2100	S	CT	3	3	177.33	30.172	102.43	252.24	157	212
83 Sep 21	2100	S	CT	0	24	60.00	5.413	57.71	62.29	40	67
83 Sep 21	2100	S	CT	1	10	91.40	7.011	86.39	96.41	84	103
83 Sep 21	2100	S	CT	2	6	116.83	5.036	111.55	122.12	109	122
83 Sep 21	2100	S	CT	3	2	165.00	4.243	126.87	203.13	162	168
83 May 31	UPER	S	CT	1	45	64.76	7.496	62.51	67.00	52	79
83 May 31	UPER	S	CT	2	43	106.63	12.923	102.67	110.59	82	133
83 May 31	UPER	S	CT	3	2	148.50	0.707	142.15	154.85	148	149
83 Sep 15	UPER	S	CT	0	97	45.78	5.349	44.71	46.86	35	60
83 Sep 15	UPER	S	CT	1	41	81.63	9.134	78.75	84.52	67	100
83 Sep 15	UPER	S	CT	2	21	113.33	12.741	107.52	119.14	100	145
83 Sep 15	UPER	S	CT	3	2	152.50	0.707	146.15	158.85	152	153
83 Aug 24	USEL	S	COHO	0	3	62.67	5.508	48.99	76.34	59	69
83 Aug 24	USEL	S	CT	0	5	48.00	1.581	46.03	49.97	46	50
83 Aug 24	USEL	S	CT	1	12	85.25	8.730	79.71	90.79	74	100
83 Aug 24	USEL	S	CT	2	6	122.50	18.008	103.61	141.39	103	146
83 Aug 24	USEL	S	CT	3	2	177.50	14.849	44.04	310.96	167	188
83 Aug 24	USEL	S	ALUT	-	49	67.96	19.958	62.23	73.69	42	118
83 Aug 24	PACH	SPS	COHO	0	203	53.50	6.351	52.63	54.38	43	75
83 Aug 24	PACH	SPS	COHO	1	31	85.10	5.747	82.99	87.20	73	96
83 Aug 24	PACH	SPS	RBT	0	11	53.64	3.171	51.50	55.77	50	59
83 Aug 24	PACH	SPS	RBT	1	3	100.33	7.234	82.37	118.29	92	105
83 Aug 24	PACH	SPS	RBT	3	1	201.00					
83 Aug 24	PACH	SPS	ALUT	-	72	62.03	13.614	58.83	65.22	44	100
83 Aug 24	PACH	SPS	ASPR	-	68	81.62	17.551	77.38	85.85	56	131
83 Aug 25	RITH	S	CT	0	16	48.00	5.774	44.93	51.07	37	58
83 Aug 25	RITH	S	CT	1	13	104.54	15.634	95.09	113.99	85	126
83 Aug 25	RITH	S	CT	2	11	155.00	25.389	137.93	172.07	129	205
83 Aug 25	RITH	S	CT	3	1	194.00					

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
84 Mar 07	FENC	TR	COHO	0	49	34.78	0.587	34.61	34.94	33	37
84 Mar 16	FENC	TR	COHO	0	40	37.35	0.949	37.05	37.65	35	40
84 Mar 23	FENC	TR	COHO	0	58	35.31	0.777	35.11	35.51	33	38
84 Apr 06	FENC	TR	COHO	0	69	34.83	1.084	34.57	35.09	33	39
84 Apr 13	FENC	TR	COHO	0	45	36.13	1.632	35.64	36.62	33	40
84 Apr 20	FENC	TR	COHO	0	94	32.11	1.410	31.82	32.39	30	39
84 Jun 13	FENC	TR	COHO	0	29	56.66	4.708	54.86	58.45	46	66
84 Jun 30	FENC	TR	COHO	0	47	55.81	4.707	54.43	57.19	43	62
84 Mar 07	FENC	TR	COHO	1	28	71.96	6.274	69.53	74.40	61	84
84 Mar 14	FENC	TR	COHO	1	35	70.97	5.554	69.07	72.88	60	89
84 Mar 21	FENC	TR	COHO	1	44	73.59	6.086	71.75	75.44	62	85
84 Mar 21	FENC	TR	COHO	2	1	94.00					
84 Mar 28	FENC	TR	COHO	1	56	73.86	6.992	71.99	75.73	60	91
84 Mar 28	FENC	TR	COHO	2	1	95.00					
84 Apr 04	FENC	TR	COHO	1	52	75.48	6.214	73.76	77.20	65	91
84 Apr 04	FENC	TR	COHO	2	4	92.50	15.022	68.61	116.39	79	106
84 Apr 11	FENC	TR	COHO	1	116	78.84	6.901	77.58	80.11	63	95
84 Apr 11	FENC	TR	COHO	2	9	101.00	10.000	93.30	108.70	90	118
84 Apr 18	FENC	TR	COHO	1	197	82.72	8.619	81.52	83.92	64	108
84 Apr 18	FENC	TR	COHO	2	27	101.44	10.070	97.45	105.44	84	120
84 Apr 25	FENC	TR	COHO	1	271	86.08	8.054	85.12	87.04	63	106
84 Apr 25	FENC	TR	COHO	2	11	111.36	8.016	105.97	116.75	105	134
84 May 02	FENC	TR	COHO	1	452	85.33	7.724	84.62	86.04	62	110
84 May 02	FENC	TR	COHO	2	22	103.64	6.779	100.63	106.64	94	119
84 May 09	FENC	TR	COHO	1	661	85.26	7.122	84.71	85.80	66	103
84 May 09	FENC	TR	COHO	2	22	101.55	7.980	98.01	105.08	85	110
84 May 16	FENC	TR	COHO	1	374	84.85	6.162	84.23	85.48	66	104
84 May 16	FENC	TR	COHO	2	11	99.55	7.421	94.56	104.54	93	110
84 May 23	FENC	TR	COHO	1	309	85.87	6.830	85.11	86.63	70	117
84 May 30	FENC	TR	COHO	1	127	85.81	6.323	84.71	86.91	66	102
84 Jun 06	FENC	TR	COHO	1	74	84.24	6.421	82.76	85.73	69	100
84 Jun 13	FENC	TR	COHO	1	17	84.12	3.257	82.44	85.79	79	90
84 May 30	2	SPS	COHO	0	90	45.96	5.702	44.76	47.15	35	61
84 May 30	3	SPS	COHO	0	65	46.38	5.126	45.12	47.65	36	56
84 May 29	4	SPS	COHO	0	124	48.12	3.385	47.53	48.72	38	56
84 May 29	4	SPS	COHO	1	5	70.20	5.404	63.48	76.92	62	76
84 May 29	5	SPS	COHO	0	35	45.57	4.224	44.12	47.02	39	60
84 May 29	6	SPS	COHO	0	29	46.24	3.602	44.87	47.61	38	54
84 May 29	6	SPS	COHO	1	4	73.50	7.594	61.43	85.57	66	84
84 May 28	8	SPS	COHO	0	46	46.59	4.282	45.32	47.86	36	55
84 May 28	8	SPS	COHO	1	1	80.00					
84 Jul 26	2	SPS	COHO	0	118	64.05	6.341	62.90	65.21	46	80
84 Jul 26	2	SPS	COHO	1	2	78.50	0.707	72.15	84.86	78	79

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
84 Jul 25	3	SPS	COHO	0	90	63.96	6.684	62.55	65.36	48	80
84 Jul 25	3	SPS	COHO	1	1	93.00					
84 Jul 25	4	SPS	COHO	0	162	59.03	6.259	58.07	59.99	43	77
84 Jul 25	4	SPS	COHO	1	4	79.75	4.272	72.96	86.54	74	83
84 Jul 25	5	SPS	COHO	0	61	62.90	5.036	61.61	64.19	51	75
84 Jul 25	5	SPS	COHO	1	4	84.75	2.872	80.18	89.32	83	89
84 Jul 24	6	SPS	COHO	0	57	64.53	4.571	63.32	65.74	57	76
84 Jul 24	6	SPS	COHO	1	6	81.33	4.320	76.80	85.87	77	88
84 Jul 24	8	SPS	COHO	0	62	66.58	4.321	65.49	67.67	59	77
84 Jul 24	8	SPS	COHO	1	3	84.00	3.464	75.40	92.60	82	88
84 Sep 26	2	SPS	COHO	0	80	76.39	6.933	74.85	77.93	58	95
84 Sep 26	3	SPS	COHO	0	65	75.98	8.455	73.90	78.07	58	97
84 Sep 26	3	SPS	COHO	1	1	101.00					
84 Sep 25	4	SPS	COHO	0	111	67.92	7.444	66.52	69.32	51	87
84 Sep 25	4	SPS	COHO	1	1	83.00					
84 Sep 25	5	SPS	COHO	0	40	72.55	5.670	70.74	74.36	60	83
84 Sep 25	5	SPS	COHO	1	3	97.33	5.773	83.00	111.67	94	104
84 Sep 25	6	SPS	COHO	0	49	74.10	5.030	72.66	75.55	64	86
84 Sep 25	6	SPS	COHO	1	7	88.00	2.309	85.86	90.14	85	92
84 Sep 24	8	SPS	COHO	0	22	79.41	5.058	77.17	81.65	68	88
84 Sep 24	8	SPS	COHO	1	3	83.00	2.000	78.03	87.97	81	85
84 May 29	TOTL	SPS	RBT	1	6	93.17	16.654	75.69	110.64	65	110
84 May 29	TOTL	SPS	RBT	2	2	112.50	7.778	42.60	182.40	107	118
84 Jul 26	2	SPS	RBT	1	1	114.00					
84 Jul 25	3	SPS	RBT	0	3	62.00	1.732	57.70	66.30	61	64
84 Jul 25	4	SPS	RBT	0	72	49.47	7.470	47.72	51.22	34	61
84 Jul 25	5	SPS	RBT	0	19	53.74	10.192	48.83	58.65	34	63
84 Jul 25	5	SPS	RBT	1	1	98.00					
84 Jul 24	6	SPS	RBT	0	35	36.26	8.176	33.45	39.06	30	64
84 Jul 24	6	SPS	RBT	1	1	106.00					
84 Jul 24	8	SPS	RBT	0	15	55.87	8.008	51.44	60.29	46	77
84 Jul 24	8	SPS	RBT	1	1	94.00					
84 Sep 26	2	SPS	RBT	0	1	92.00					
84 Sep 26	2	SPS	RBT	1	1	121.00					
84 Sep 26	3	SPS	RBT	0	2	68.50	28.991	-192.06	329.06	48	89
84 Sep 26	3	SPS	RBT	1	2	123.00	18.385	-42.23	288.23	110	136
84 Sep 25	4	SPS	RBT	0	44	66.82	9.369	63.98	69.66	48	82
84 Sep 25	4	SPS	RBT	1	1	105.00					
84 Sep 25	5	SPS	RBT	0	40	73.40	9.958	70.22	76.58	59	90
84 Sep 25	6	SPS	RBT	0	57	56.18	7.354	54.23	58.12	42	83
84 Sep 25	6	SPS	RBT	1	2	121.00	9.899	32.03	209.97	114	128
84 Sep 24	8	SPS	RBT	0	19	78.00	6.807	74.72	81.28	69	92
84 Sep 24	8	SPS	RBT	1	1	117.00					
84 Sep 24	8	SPS	RBT	2	1	128.00					

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
84 May 29	TOTL	SPS	CT	1	2	96.00	11.314	-5.68	197.68	88	104
84 May 29	TOTL	SPS	CT	2	3	120.00	17.521	76.50	163.50	103	138
84 May 29	TOTL	SPS	CT	3	1	178.00					
84 Jul 24	TOTL	SPS	CT	1	13	103.08	10.805	96.54	109.61	91	120
84 Jul 24	TOTL	SPS	CT	2	1	195.00					
84 Sep 26	TOTL	SPS	CT	1	9	112.33	14.765	100.96	123.70	92	137
84 Sep 25	TOTL	SPS	CT	2	2	193.00	2.828	167.58	218.42	191	195
84 May 30	2	SPS	ALUT	-	68	65.62	9.564	63.31	67.93	47	94
84 May 30	3	SPS	ALUT	-	8	83.63	17.229	69.25	98.00	68	110
84 May 29	4	SPS	ALUT	-	20	86.65	17.467	78.49	94.81	61	112
84 May 29	5	SPS	ALUT	-	6	78.33	17.761	59.70	96.97	65	112
84 May 29	6	SPS	ALUT	-	9	78.22	19.974	62.84	93.60	54	107
84 May 28	8	SPS	ALUT	-	5	98.40	5.550	91.50	105.30	89	103
84 Jul 26	2	SPS	ALUT	-	59	69.81	9.551	67.33	72.30	49	98
84 Jul 25	3	SPS	ALUT	-	14	75.79	15.656	66.75	84.82	59	103
84 Jul 25	4	SPS	ALUT	-	32	78.31	14.726	73.03	83.60	57	121
84 Jul 25	5	SPS	ALUT	-	43	78.93	12.861	74.99	82.87	58	111
84 Jul 24	6	SPS	ALUT	-	14	82.79	14.089	74.65	90.92	64	115
84 Jul 24	8	SPS	ALUT	-	26	82.96	13.806	77.38	88.54	59	115
84 Sep 26	2	SPS	ALUT	-	58	70.36	12.884	66.98	73.75	41	99
84 Sep 26	3	SPS	ALUT	-	19	78.68	15.037	71.44	85.93	56	105
84 Sep 25	4	SPS	ALUT	-	20	83.75	14.279	77.08	90.42	62	114
84 Sep 25	5	SPS	ALUT	-	26	82.38	13.679	76.86	87.91	65	112
84 Sep 25	6	SPS	ALUT	-	16	91.94	12.933	85.05	98.82	72	118
84 Sep 24	8	SPS	ALUT	-	16	92.00	15.659	83.66	100.34	62	118
84 May 30	2	SPS	ASPR	-	16	93.44	13.803	86.09	100.79	69	122
84 May 30	3	SPS	ASPR	-	3	116.33	8.327	95.66	137.01	107	123
84 May 29	4	SPS	ASPR	-	2	125.50	27.577	-122.34	373.35	106	145
84 May 29	6	SPS	ASPR	-	1	81.00					
84 Jul 26	2	SPS	ASPR	-	17	93.94	14.329	86.57	101.31	74	121
84 Jul 25	3	SPS	ASPR	-	1	130.00					
84 Jul 25	4	SPS	ASPR	-	3	133.67	18.771	87.07	180.27	112	145
84 Sep 26	2	SPS	ASPR	-	15	97.20	11.682	90.75	103.65	81	114
84 Sep 26	3	SPS	ASPR	-	6	118.17	12.860	104.67	131.66	106	141
84 Sep 25	5	SPS	ASPR	-	1	90.00					
84 Jun 01	2100	S	CT	0	3	26.00	1.000	23.52	28.48	25	27
84 Jun 01	2100	S	CT	1	3	82.33	12.858	50.41	114.26	73	97
84 Jun 01	2100	S	CT	2	2	128.50	6.364	71.31	185.70	124	133
84 Jun 01	2100	S	CT	3	1	174.00					
84 Sep 24	2100	S	CT	0	53	51.92	8.702	49.53	54.32	30	69
84 Sep 24	2100	S	CT	1	6	90.67	10.152	80.02	101.32	80	104
84 Sep 24	2100	S	CT	2	4	138.25	28.289	93.27	183.23	112	178
84 Sep 24	2100	S	CT	3	1	223.00					

APPENDIX TABLE XI (cont'd)

DATE	LOC	GEAR	SPEC	AGE	N	MEAN	SDEV	C.I.MIN	C.I.MAX	RANGE MIN	RANGE MAX
84 May 31	UPER	S	CT	1	47	71.83	15.229	67.36	76.29	46	110
84 May 31	UPER	S	CT	2	21	122.81	15.848	115.58	130.04	93	151
84 Sep 27	UPER	S	CT	0	38	47.34	7.068	45.03	49.66	32	61
84 Sep 27	UPER	S	CT	1	49	86.84	11.530	83.53	90.15	69	125
84 Sep 27	UPER	S	CT	2	9	130.89	16.321	118.32	143.46	104	163
84 May 31	5000	S	CT	1	62	77.76	16.421	73.61	81.91	49	102
84 May 31	5000	S	CT	2	61	121.59	13.215	118.21	124.97	103	161
84 Aug 29	USEL	S	COHO	0	1	68.00					
84 Aug 29	USEL	S	CT	0	12	52.83	4.589	49.92	55.75	45	60
84 Aug 29	USEL	S	CT	1	9	89.11	13.383	78.81	99.42	74	119
84 Aug 29	USEL	S	CT	2	6	139.50	19.552	118.99	160.01	111	163
84 Aug 29	USEL	S	ALUT	-	34	71.82	11.963	67.66	75.99	52	99
84 Aug 29	USEL	S	ASPR	-	4	95.00	7.257	83.46	106.54	88	105
84 Aug 28	PACH	SPS	COHO	0	232	60.28	7.527	59.31	61.25	45	82
84 Aug 28	PACH	SPS	COHO	1	7	89.00	4.509	84.82	93.18	85	95
84 Aug 28	PACH	SPS	RBT	0	76	50.26	4.383	49.26	51.26	41	62
84 Aug 28	PACH	SPS	RBT	1	2	110.00	9.899	21.03	198.97	103	117
84 Aug 28	PACH	SPS	CT	0	14	51.00	3.742	48.84	53.16	45	58
84 Aug 28	PACH	SPS	CT	1	2	99.50	21.920	-97.51	296.51	84	115
84 Aug 28	PACH	SPS	CT	2	1	198.00					
84 Aug 28	PACH	SPS	ALUT	-	58	70.22	9.487	67.73	72.72	50	95
84 Aug 28	PACH	SPS	ASPR	-	36	91.94	14.769	86.95	96.94	68	124
84 Aug 29	RITH	S	CT	0	45	46.87	5.354	45.26	48.47	38	58
84 Aug 29	RITH	S	CT	1	11	102.64	17.563	90.83	114.45	74	126
84 Aug 29	RITH	S	CT	2	5	154.80	14.360	136.95	172.65	143	178

Appendix Table XII. Fish length-weight data and condition factor (K).

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1983								
Mar. 20	Carnation	Fence	Chum	0	45	0.616	9349.010	0.445
Mar. 24	Carnation	Fence	Chum	0	50	0.603	2427.000	0.800
Mar. 11	Carnation	Fence	Coho	0	8	0.782	28.330	2.000
Mar. 24	Carnation	Fence	Coho	0	8	0.817	1678.000	0.899
Mar. 25	Carnation	Fence	Coho	1	11	1.032	5.677	2.999
Mar. 26	Carnation	Fence	Coho	1	17	1.014	0.995	3.004
Mar. 31	Carnation	Fence	Coho	1	19	1.037	3.015	2.757
April 8	Carnation	Fence	Coho	1	28	1.043	0.671	3.102
April 14	Carnation	Fence	Coho	1	17	0.963	0.829	3.033
April 21	Carnation	Fence	Coho	1	30	0.956	5.303	2.616
April 28	Carnation	Fence	Coho	1	19	0.946	2.981	2.742
May 12	Carnation	Fence	Coho	1	15	0.924	1.776	2.854
May 26	Carnation	Fence	Coho	1	14	0.988	1.876	2.855
April 15	Carnation	Fence	Coho	2	9	1.011	1.659	2.893
May 27	Carnation	II	Coho	0	13	1.003	0.673	3.112
May 26	Carnation	VI	Coho	0	12	0.999	0.167	3.471
May 27	Carnation	All	Coho	1	6	1.108	9.569	2.499
July 28	Carnation	II	Coho	0	14	1.089	0.629	3.133
July 27	Carnation	VI	Coho	0	14	1.094	0.514	3.181
July 28	Carnation	All	Coho	1	3	1.095	0.675	3.109
Sep. 22	Carnation	II	Coho	0	24	1.083	0.793	3.075
Sep. 21	Carnation	VI	Coho	0	22	1.100	0.482	3.197
Sep. 22	Carnation	All	Coho	1	6	1.131	10.600	2.503
May 26	Carnation	VI	Rainbow	1	8	0.944	0.333	3.233
May 26	Carnation	All	Rainbow	2	5	0.992	2.189	2.835
July 27	Carnation	VI	Rainbow	0	8	0.965	1.879	2.828
July 27	Carnation	All	Rainbow	1&2	4	1.004	1.588	2.905
Sep. 21	Carnation	VI	Rainbow	0	4	1.003	3.189	2.726
Sep. 22	Carnation	All	Rainbow	1&2	7	0.956	0.192	3.331
May 27	Carnation	All	Cutthroat	1&2	9	0.987	1.844	2.871
July 27	Carnation	All	Cutthroat	1	6	0.988	0.837	3.036
July 28	Carnation	All	Cutthroat	2&3	6	0.946	1.719	2.880
Sep. 22	Carnation	All	Cutthroat	1&2	6	0.982	5.376	2.658

Appendix XII (cont'd)

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1983								
May 27	Carnation	II	Aleuticus	All	11	0.991	0.760	3.071
May 26	Carnation	VI	Aleuticus	All	8	0.991	0.696	3.077
July 28	Carnation	II	Aleuticus	All	13	1.036	0.322	3.278
July 27	Carnation	VIII	Aleuticus	All	6	1.122	2.599	2.808
Sep. 22	Carnation	II	Aleuticus	All	19	0.982	1.381	2.921
Sep. 21	Carnation	VI	Aleuticus	All	10	1.101	3.036	2.771
May 27	Carnation	II	Asper	All	9	1.072	0.470	3.187
July 28	Carnation	II	Asper	All	5	1.094	0.278	3.302
Sep. 22	Carnation	II	Asper	All	12	1.059	0.222	3.349
June 1	Carnation	Trib C	Cutthroat	1-3	15	0.997	1.497	2.929
Sep. 21	Carnation	Trib C	Cutthroat	0	13	1.005	0.423	3.211
				1-3	10	0.952	0.583	3.104
May 31	Carnation	IX	Cutthroat	1	12	0.985	0.581	3.127
				2&3	19	0.966	0.451	3.161
Sep. 15	Carnation	IX	Cutthroat	0	12	0.895	0.542	3.133
				1	9	0.914	2.443	2.778
				2&3	7	0.997	0.346	3.222
Aug. 24	Useless	I	Coho	0	2	1.075	0.335	3.280
Aug. 24	Useless	I	Rainbow	1	1	0.980		
Aug. 24	Useless	I	Cutthroat	0	3	1.012	0.001	4.971
				1-3	12	0.910	0.154	3.356
Aug. 24	Useless	I	Aleuticus	All	26	0.987	0.079	3.585
Aug. 24	Pachena	I	Coho	0	21	1.025	0.543	3.155
				1	11	1.066	0.633	3.117
Aug. 24	Pachena	I	Rainbow	0	9	0.907	4.023	2.626
				1-3	4	0.947	0.424	3.167
Aug. 24	Pachena	I	Cutthroat	0	1	0.813		
				1	1	0.881		
Aug. 24	Pachena	I	Aleuticus	All	18	0.880	0.165	3.396
Aug. 24	Pachena	I	Asper	All	22	1.058	0.447	3.192
Aug. 25	Ritherdon	I	Cutthroat	0	8	0.893	0.367	3.232
				1	8	0.914	0.624	3.082
				2&3	11	0.932	0.680	3.062

Appendix table XII (cont'd)

Date	Location	Section	Species	age	n	K	a (x10-5)	b
1984								
Mar. 29	Carnation	Fence	Coho	1	10	0.982	0.162	3.417
April 4	Carnation	Fence	Coho	1	18	0.957	1.894	2.842
April 12	Carnation	Fence	Coho	1	16	1.019	3.176	2.740
April 19	Carnation	Fence	Coho	1	27	0.943	1.277	2.931
April 25	Carnation	Fence	Coho	1	33	0.968	1.217	2.949
May 2	Carnation	Fence	Coho	1	37	0.955	1.044	2.980
May 8	Carnation	Fence	Coho	1	36	0.976	1.282	2.939
May 15	Carnation	Fence	Coho	1	43	0.962	1.479	2.903
May 21	Carnation	Fence	Coho	1	42	0.981	4.088	2.681
May 28	Carnation	Fence	Coho	1	28	0.991	0.897	3.022
June 3	Carnation	Fence	Coho	1	57	0.973	3.013	2.745
June 8	Carnation	Fence	Coho	1	15	0.990	6.197	2.588
April 12	Carnation	Fence	Coho	2	12	0.975	11.710	2.464
May 30	Carnation	II	Coho	0	23	0.989	0.334	3.284
May 30	Carnation	III	Coho	0	21	0.994	0.328	3.291
May 29	Carnation	IV	Coho	0	16	1.067	1.012	3.015
May 29	Carnation	V	Coho	0	14	1.004	0.437	3.218
May 29	Carnation	VI	Coho	0	12	0.999	0.147	3.501
May 28	Carnation	VIII	Coho	0	16	0.993	0.141	3.512
May 29	Carnation	All	Coho	1	10	1.138	3.041	2.771
July 26	Carnation	II	Coho	0	27	1.092	0.434	3.222
July 24	Carnation	VIII	Coho	0	18	1.082	0.849	3.058
July 24	Carnation	All	Coho	1	3	1.153	17.160	2.388
Sep. 26	Carnation	II	Coho	0	23	1.081	1.088	2.998
Sep. 26	Carnation	III	Coho	0	30	1.091	0.714	3.098
Sep. 25	Carnation	IV	Coho	0	32	1.068	0.680	3.108
Sep. 25	Carnation	V	Coho	0	17	1.074	0.365	3.252
Sep. 25	Carnation	VI	Coho	0	20	1.111	0.894	3.051
Sep. 24	Carnation	VIII	Coho	0	15	1.126	1.795	2.893
Sep. 25	Carnation	All	Coho	1	5	1.113	1.068	3.009
May 29	Carnation	All	Rainbow	1&2	8	0.982	0.523	3.138
July 24	Carnation	VIII	Rainbow	0	8	0.875	10.740	2.381
July 26	Carnation	All	Rainbow	1	2	0.998	0.059	3.610
Sep. 26	Carnation	II & III	Rainbow	0	3	1.011	5.236	2.625
Sep. 25	Carnation	IV	Rainbow	0	24	0.998	1.142	2.967
Sep. 25	Carnation	V	Rainbow	0	19	0.993	1.072	2.982
Sep. 25	Carnation	VI	Rainbow	0	24	1.099	6.729	2.545
Sep. 24	Carnation	VIII	Rainbow	0	11	1.037	32.780	2.208
Sep. 26	Carnation	All	Rainbow	1&2	8	1.022	0.534	3.136
May 29	Carnation	All	Cutthroat	1-3	6	0.996	0.116	3.435
July 24	Carnation	VIII	Cutthroat	1&2	5	0.983	2.475	2.810
Sep. 26	Carnation	All	Cutthroat	1&2	10	0.994	1.386	2.930

Appendix XII (cont'd)

Date		Location	Section	Species	age	n	K	a (x10-5)	b
1984									
May	30	Carnation	II	Aleuticus	All	18	1.062	1.572	2.912
May	30	Carnation	III	Aleuticus	All	8	1.087	1.534	2.921
May	29	Carnation	IV	Aleuticus	All	15	1.045	1.782	2.882
May	29	Carnation	V	Aleuticus	All	6	1.048	7.449	2.552
May	29	Carnation	VI	Aleuticus	All	9	1.066	5.048	2.649
May	28	Carnation	VIII	Aleuticus	All	5	1.072	3.011	2.775
July	26	Carnation	II	Aleuticus	All	15	1.079	0.295	3.305
July	24	Carnation	VIII	Aleuticus	All	12	1.106	0.577	3.143
Sep.	26	Carnation	II	Aleuticus	All	28	1.049	1.016	3.014
Sep.	26	Carnation	III	Aleuticus	All	14	1.104	0.251	3.337
Sep.	25	Carnation	IV	Aleuticus	All	9	1.143	0.893	3.057
Sep.	25	Carnation	V	Aleuticus	All	16	1.101	1.182	2.984
Sep.	25	Carnation	VI	Aleuticus	All	8	1.142	0.372	3.250
Sep.	24	Carnation	VIII	Aleuticus	All	12	1.112	1.347	2.965
May	30	Carnation	II	Asper	All	12	1.109	0.669	3.111
May	30	Carnation	III,IV,VI	Asper	All	6	1.131	0.155	3.418
July	26	Carnation	II	Asper	All	10	1.111	0.502	3.175
Sep.	26	Carnation	II	Asper	All	10	1.111	1.707	2.908
Sep.	26	Carnation	III & V	Asper	All	6	1.141	6.020	2.652
June	1	Carnation	Trib C	Cutthroat	0	3	0.714	0.001	5.083
					1&3	6	1.025	1.281	2.952
Sep.	24	Carnation	Trib C	Cutthroat	0	33	0.920	0.250	3.328
					1&3	10	0.934	1.042	2.979
May	31	Carnation	IX	Cutthroat	1	17	0.948	0.356	3.231
					2	11	0.929	2.510	2.794
Sep.	27	Carnation	IX	Cutthroat	0	18	0.943	0.990	2.990
					1	16	0.990	0.716	3.073
					2	8	0.980	1.862	2.869
Aug.	29	Useless	I	Coho	0	1	1.081		
Aug.	29	Useless	I	Cutthroat	0	12	0.953	11.420	2.375
					1	9	0.934	0.952	2.997
					2	6	0.940	0.636	3.078
Aug.	29	Useless	I	Aleuticus	All	34	1.024	0.809	3.057
Aug.	29	Useless	I	Asper	All	4	1.092	2.472	2.821
Aug.	28	Pachena	I	Coho	0	17	1.060	0.970	3.025
					1	3	1.047	1.250	2.961
Aug.	28	Pachena	I	Rainbow	0	9	0.997	2.971	2.725
					1	2	0.966	1.337	2.931
Aug.	28	Pachena	I	Cutthroat	0	2	0.944	0.000	5.177
					1&2	3	1.026	1.035	2.984
Aug.	28	Pachena	I	Aleuticus	All	10	1.037	0.185	3.402
Aug.	28	Pachena	I	Asper	All	7	1.181	2.624	2.830
Aug.	29	Ritherdon	I	Cutthroat	0	42	0.983	0.534	3.159
					1	9	0.916	0.252	3.284
					2	4	0.900	1046.000	1.601